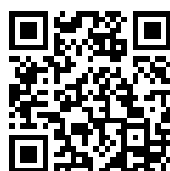

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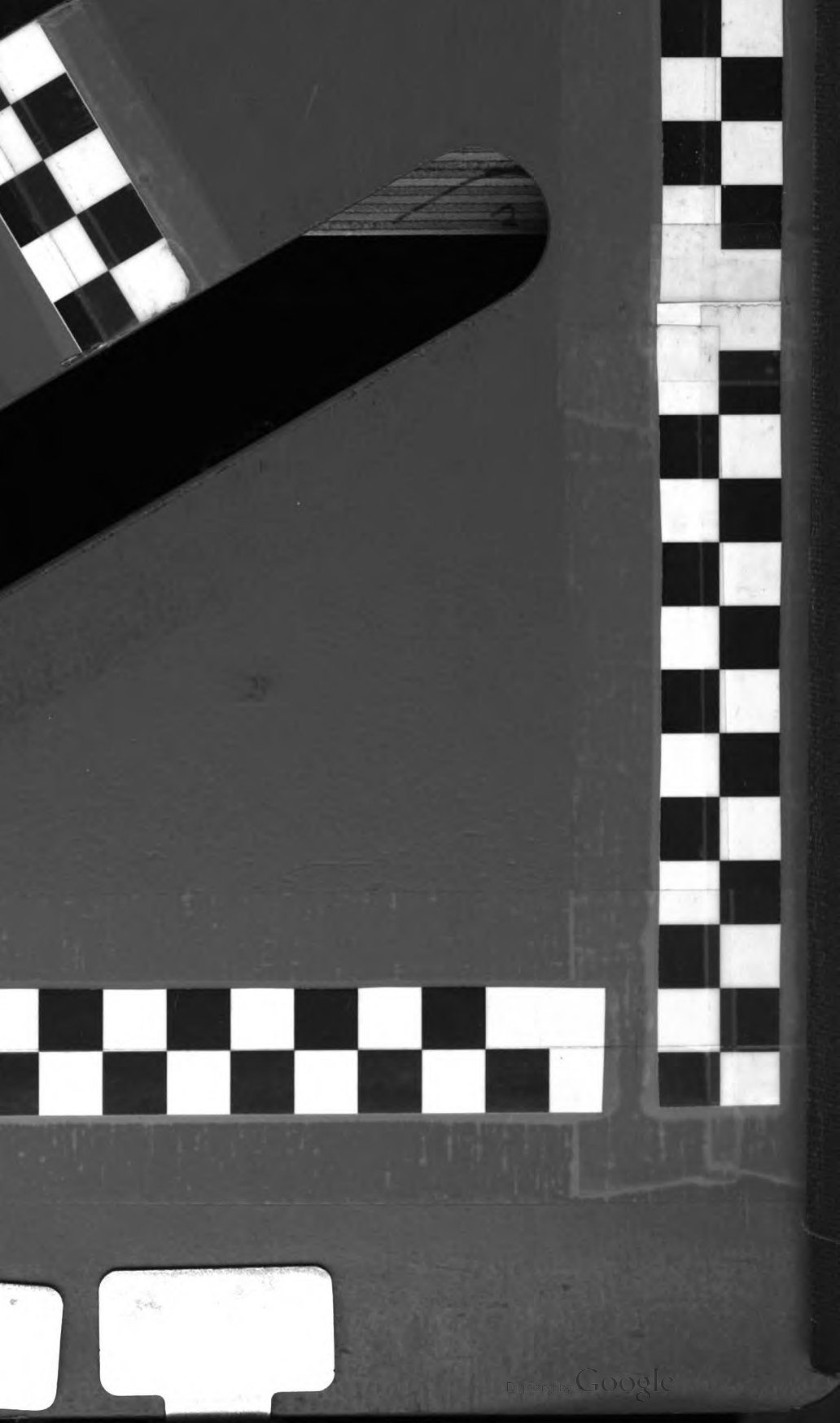
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ANNUAL REPORT

of the

SECRETARY OF
THE INTERIOR

CONDENSED WAR EDITION
FISCAL YEAR ENDED JUNE 30, 1942

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SECRETARY OF
THE INTERIOR

CONDENSED WAR EDITION
FISCAL YEAR ENDED JUNE 30, 1942

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ANNUAL REPORT

of the

SECRETARY OF
THE INTERIOR



S FISCAL YEAR ENDED JUNE 30, 1941

UNITED STATES
DEPARTMENT OF THE
INTERIOR

HAROLD L. ICKES
Secretary

UNITED STATES GOVERNMENT PRINTING OFFICE, WASHINGTON
For sale by the Superintendent of Documents, Washington, D. C., Price

FEB 1 '43

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Successful Mobilization

of the Nation's natural resources for war, like their conservation in time of peace, depends upon the cooperation of a citizenry fully informed as to the tasks confronting it and the progress made toward their solution.

¶ To meet this requirement, the Department of the Interior presents a streamlined emergency War Edition of the Secretary's Annual Report for the Fiscal Year 1942, sharply restricted in volume and stripped of illustrations and detailed statistical material to meet the exigencies of war economy demands.



Letter of Transmittal

The Secretary of the Interior

HAROLD L. ICKES, Secretary

MY DEAR MR. PRESIDENT: During the last 12 months, the Department of the Interior has been dedicated to a vigorous war program. In some phases of the task of harnessing our natural resources for war, we have been highly successful. In others, we have failed to attain the goals we should have achieved. But in the final analysis, we have made real progress.

It is worthwhile, it seems to me, at a time of crisis, to review our effort of the last year and to appraise our performance under fire, so that we may evaluate our progress and reset our sights. We entered the fiscal year under the stress of a defense program and ended it under the greater pressure of war. The task of this Department was to convert its custodianship of the Nation's natural resources from a peacetime administration to that of war use.

This was an eye-opening proceeding. For years, this Nation had been deluded with the idea that it was practically self-sufficient, that its industrial processes were the world's best, and that its supplies were practically inexhaustible. A painful hangover resulted from that spree. We woke up to find out that we did not have enough steel to do the job; we did not have enough aluminum; we were short of power; we lacked magnesium; our sources of manganese were too far away to do us much good; our supply of timber and lumber did not hold out; our fisheries and other food resources could not be operated on the old basis nor supply enough to meet demand; our coal supply became endangered and the chaos of war tied our petroleum service up into knots.

In short, we discovered, that so far as our natural resources were concerned, we had been doing everything in the easy way. We had, up to the last year or two, been skimming the cream—and the cream ran out. While the enemies we despised had been making the most of their meager resources—and making them do the job—we had constructed our whole economy on our fat. The former “had-not” nations turned to their secondary ores and low-grade minerals, and by sweat and effort learned how to use them. We neglected our secondary sources of supply—the low-grade deposits of minerals,

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for example—and went merrily on our way, using only the best, and therefore the most profitable. Then we discovered that we did not have enough of the best to meet our needs and that we must perforce proceed to the utilization of what we did have.

It was with this process of conversion that the Department of the Interior was chiefly concerned during the last year. The accumulated knowledge of our technical bureaus was put to work in as many directions as possible. New processes for ore treatment and metal extraction were devised and put into effect; new programs for the utilization of secondary deposits of minerals were effectuated, and some industries which had been accustomed to doing things the easy way were persuaded to try the hard way. It is in this connection that I cannot, with candor, assert that we have been successful. Our proposals for the complete utilization of certain domestic minerals, for example, did not meet with whole-hearted welcome. In some instances, temporary expedients seemed to be preferred by some groups to imaginative, full-scale adoption of novel, though proven, methods. We endeavored to work closely with the War Production Board in order that war industry might have the benefit of the work of our scientists and technical bureaus. The inertia of the old way, the weight of industrial tradition, the following of the established pattern, frequently induced heavy industries to postpone technical innovations. In my opinion, this was a postponement of the inevitable. Whether this postponement has been costly to the Nation in the long run remains to be seen.

For all of that, our efforts as a whole have been fruitful. With natural resources as our field, we early realized the need for drastic action in utilizing that which was within our reach, and the Department organized a definite war program with stated objectives for each bureau and agency. This drive was aimed at procuring the sinews for conflict—the metals, oil, power, fuel, helium, food, land, water, and timber available for war production and the equipment of the United Nations. Our activities increased and hastened production in the mines and in the mills; in the factories and yards where metals are processed and fabricated into planes, tanks, and ships; in the forests, on irrigation projects producing food and in the metallurgical laboratories. The program for discovery and exploration of new deposits of strategic and critical minerals was pushed vigorously with some encouraging results.

To stimulate the prosecution of war activities within the Department, we established a War Resources Council. This Council, composed of responsible officers of the Department, has coordinated our war work and has encouraged our bureaus to undertake programs which would contribute the most to the successful prosecution of the war and the production problems which are involved.

A few facts show the extent to which we have provided additional resources or led the way in wielding those at hand against the enemy with greater effect. Generating capacity on reclamation projects increased by 43 percent. From Columbia River projects alone, nearly 2,000,000,000 kilowatt-hours of power poured into war plants. By a process developed in our laboratories, it appears that enough manganese can be extracted from low-grade domestic ores to make 87,000,000 tons of steel annually. More than a million tons of bauxite, the common source of aluminum, and other valuable ores have been found in our search for strategic metals. In the course of increasing these essentials of war, we have laid the groundwork for further production during ensuing years of more power, more metals, more food; of more and better-mobilized natural resources of all kinds.

The soundness of the conservation policies put into effect by your Administration when it came into office is now clearly apparent. Our activities during the last year in mobilizing for war could never have been as effective if previous policies had been less sound. Pearl Harbor and the events that followed have taught us that speed in war means ready access for the Nation as a whole to its resources. For some time this Department has worked to clear the Nation's title to many resources where conflicting claims have arisen. These actions, and our general progress in encouraging the wise use of our natural heritage, constituted a long advance toward mobilization of our resources in this time of great peril.

Throughout our activities we have streamlined for war. Many of our normal activities, desirable and essential in times of peace, have been laid aside or deemphasized. War work has been given the right-of-way and the curtailment of many normal functions has been severe. Economies have been put into effect, even to the degree that they have become painful. This belt-tightening has been extended into such details of administration as the reduction of printing and the discontinuance or curtailment of publications. This report has been reduced in size and content in accordance with that policy, and represents a genuine war edition. The length of the report has been halved, and other economies have been effected in format and printing. Because of this, I will not report to you in as great detail as customary in this letter, but I do wish to call your attention to a few pertinent facts that emphasize such progress in the war program as we have made.

The Bureau of Mines

The Bureau of Mines in December 1941 greatly expanded its war program. Skilled engineers, chemists, metallurgists, statisticians, economists, and others intensified their activities and directed them

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toward putting idle mineral resources to work and speeding up the mine to metal cycle.

From the Bureau's laboratories and pilot plants emerged several new and better processes for treating strategic, critical, and essential ores; exploratory crews brought reports of new ore deposits which now are being developed; and the economists and statisticians assembled data to aid the Army, the Navy, the WPB, and other war agencies in their planning.

Meanwhile, the Bureau extended its program of promoting safety and efficiency in the mineral industries. This will conserve manpower and machinery and will help make secure from interruption the output of materials going into tanks, planes, ships, guns, and other equipment for the United Nations.

The Bureau's war plans utilized more than 30 years of experience and progress in the conservation and development of the Nation's mineral resources. To help offset the threatened curtailment of mineral imports from foreign countries, in cooperation with the Geological Survey, the Bureau in 1939 launched an investigation of domestic deposits of strategic minerals including antimony, chromium, manganese, mercury, nickel, tin, and tungsten. As the war spread throughout the world and the shipping situation became more acute, the Bureau's quest for domestic mineral deposits grew in importance and extent until it embraced virtually all of the important engineering metals. During the 1942 fiscal year alone, important reserves of chromite, manganese, mercury, tungsten, iron ore, bauxite, and alumina clay were charted.

Some of the indicated deposits were substantial. The estimated reserves of chromite were increased by 2,300,000 tons and production began in several areas. There were several discoveries of usable mercury and five findings of tungsten. Exploration for manganese ore of milling grade brought increases in reserves of more than 1,100,000 tons. In addition, more than 1,000,000 tons of workable bauxite were marked out and the exploration of five clay deposits pointed to 4,600,000 tons of ore containing 35 percent or more alumina.

In Alaska and in many of the ore-bearing districts of the Nation, the Bureau engineers faced adverse conditions and rough terrain to carry on their exploratory work of drilling, drifting, sinking, and trenching. By the end of the fiscal year, 740 deposits had been examined and rated.

Paralleling this work, metallurgists and chemists worked in laboratories and pilot plants devising methods of recovering metals from low-grade and complex ores. From these experiments it became known that substantial quantities of manganese, chromium, magnesium, and aluminum could be obtained from such domestic ores. Processes were developed for beneficiating ores containing antimony,

copper, iron, mercury, nickel, tungsten, zinc, and fluorspar, while methods were worked out for treating ores containing aluminum, cobalt, and magnesium.

Toward the end of the fiscal year, the Bureau reorganized its operating structure to place still greater emphasis on exploratory work, the development of additional metallurgical processes, and the utilization of these methods on a wider scale to bring idle ores into the production line. Examples of this program are the pilot plants for producing sponge iron and for reducing zinc ores with natural gas, together with an expansion of investigations in beneficiating low-grade bauxite ores, alumina-bearing clays, alunite and chromite, and in the production of electrolytic chromium and manganese.

Important gains also were registered in the field of nonmetallics during the year. On the basis of Bureau findings, the War Production Board made arrangements for the commercial production of flake graphite from domestic sources to overcome a shortage of the imported variety. The Bureau determined that some west coast sands could be treated and used in place of Belgian glass sand; it participated in the discovery of new sources of ceramic talc suitable for radio insulators; and conducted studies which revealed that certain volcanic rocks can provide workable substitutes for magnesite brick, a refractory material once imported from Austria and Greece.

Helium, the lightweight, noninflammable gas of which this Nation has a world monopoly, flowed in a greater volume from the Bureau's plant at Amarillo, Tex., in response to ever-increasing demands from the Army, Navy, and various Government and civilian agencies. To provide ample supplies of this gas for barrage balloons, blimps, and other uses, the production of the Amarillo plant established a new record and the Bureau began enlarging the facilities and constructing new plants.

Petroleum and natural gas engineers shouldered additional responsibilities as a direct result of the war. Laboratory research and field studies by petroleum engineers and surveys by Bureau statisticians gave war agencies detailed information regarding this Nation's ability to increase its output of aviation gasoline. The Bureau opened a new field office to stimulate crude oil production from the Appalachian fields. Other field offices marshaled their chemistry and refining experts to evolve solutions of technical problems in the field of petroleum and natural gas.

Looking to the time when our petroleum reserves may be depleted, the Bureau continued its research on the production of gasoline, fuel oil, and other byproducts from coal. New coals were tested and their suitability to liquefaction was determined. The Bureau made plans to study another process—the Fischer-Tropsch method—for pro-

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ducing motor fuels from coal. Bureau chemists analyzed more than 15,000 coal samples to aid the Army, the Navy, and other agencies in their purchases of millions of tons of coal.

Expanding its program to assist workers and management in curbing the toll of death and injuries in the coal-mining industry, the Bureau began the systematic inspection of coal mines by Federal inspectors for the first time as authorized under the Coal Mine Inspection Act of 1941. Up to June 30, 400 mines had been inspected. While the act was not a wartime measure, the inspection program became doubly important after December 7, 1941, because of the absolute need for conserving manpower and avoiding interruptions in production schedules resulting from accidents and disasters.

The Bureau also was designated to administer the Federal Explosives Act, and as part of a Nation-wide move to protect production, supply, storage, and transportation facilities, the Bureau was made responsible for helping to protect coal mines, metal mines, quarries, mills, smelters, and allied mineral facilities from sabotage and subversive action. More than 100,000 persons received training in first aid, accident prevention, and mine rescue work, bringing the total instructed in first aid alone to more than 1,500,000.

Time and again the Bureau responded to requests from war agencies for assistance in particular problems. Demolition studies were conducted in cooperation with the Army; confidential research regarding the health factors in military equipment was undertaken for the Army and Navy; high-speed explosion diaphragms were developed for war industries and studies were made of the explosion and inflammability characteristics of chemicals used by the synthetic rubber and plastic industries; plant security examinations were conducted for the Ordnance Department of the Army; a new method of extinguishing magnesium fires in industrial plants was developed; and several experts of the Bureau acted in consultative capacities in various civilian defense activities.

The Bureau of Reclamation

An important role was played by the Bureau of Reclamation during the fiscal year in the war work of the West. The Bureau functioned as chief supplier of electric power, foodstuffs, and water—three basic essentials of national existence in war or in peace. Four decades of sound engineering work in the West made it possible for great multipurpose reclamation projects to supply these three basic needs in larger and more important quantities for hundreds of cities, thousands of war factories, and millions of war workers.

Of 73 reclamation projects in operation, under construction or authorized, 45 were producing power and supplying water for irri-

gation, municipalities, and war industries. Twenty were under construction.

Brought to completion were 5 of the 15 storage dams under construction. Three of them—Grand Coulee, Friant, and Marshall Ford—rank among the five largest concrete dams in the world.

Outstanding was the Bureau's contribution of hydroelectric power—the potent energy that turns the machines that turn out the guns. In both the Pacific Northwest and the Southwest, Reclamation's giant power plants were the bulwark behind industries already working at top speed or mushrooming into existence for the production of war material. Energy poured out of these reclamation plants and others in 11 States for manufacturing and mining; for copper, steel, aluminum, magnesium; for bombs, planes, and ships.

Generative capacity was increased tremendously during the year, due chiefly to the installation of several huge hydro generators—bigger than any others in the world—in the Grand Coulee Dam power plant, Washington. In the Boulder Dam power plant, Arizona-Nevada, also, another big generator was installed and placed in operation—to make by far the most powerful array of dynamos ever assembled and synchronized into action. Being hurried to completion as the year closed were more generators at Boulder, Grand Coulee, and Parker (Arizona-California) Dams, due to start operating within 6 months.

Water, a primary essential in war, was provided during the year for municipal areas of 2,500,000 population. Extensive industrial and military concentrations were located in the areas. The Rio Grande project in New Mexico, Tex., the Contra Costa Canal on the Central Valley project in California, and the Provo River project in Utah were among these projects.

Aside from the generation of power, and the release of water itself for domestic and industrial uses, the regional production of food, forage, and fiber on the reclamation projects in the West supplied urgent needs. This production reduced the burden on transcontinental railroads and highways for the movement of men and equipment. It meant speedy delivery of supplies, and the saving of freight cars, of steel for rails and equipment, of fuel for engines, and of gas, oil, and rubber for trucks.

Stored water irrigated more than 3,000,000 acres of productive land. Irrigation district officials collaborated with the Bureau in an intense effort to get the most from high-production reclamation farms. The gross value of the 1941 crops on land served with reclamation water was \$159,885,998, a 35 percent increase over the \$117,788,677 of 1940. These values do not include the livestock fattened on reclamation projects, nor dairy products such as milk, butter and cheese, and poultry

and eggs—which would increase the totals perhaps more than 25 per cent additional.

The storage capacity of the 81 reclamation reservoirs in the West at the end of the fiscal year was 61,610,283 acre-feet, a gain of 13,845,680 acre-feet—29 percent over the July 1, 1941, capacity. Active storage, available for power, irrigation and domestic and industrial uses, was 47½ million acre-feet compared with 41½ million last year, a huge increase graphically illustrating the foresightedness of the Bureau in undertaking construction long in advance of emergency need.

Set in motion also during the year was a program for lessening the shock of post-war dislocation. Under investigation were 209 river basins and potential irrigation or multiple-purpose projects in 17 Western States, which would produce an inventory of water resources and point the way to their economical and effective use in a region where water is the most precious natural resource and the surest basis for economic expansion.

From studies that have been completed or are well advanced, the Bureau is selecting for a reservoir of public works a minimum of 50 feasible post-war projects. Demobilized soldiers, sailors, and marines will require employment in useful occupations. Industrial workers released from war factories will want work close to their original homes. This shelf of projects and the remaining construction on more than 20 projects where work has been retarded by war conditions, including the Columbia Basin Reclamation project in the State of Washington, will provide some of that work. On completion the projects will offer settlement opportunities on irrigated farms where families can become self-sustaining.

The Bonneville Power Administration

In the Pacific Northwest, the Bonneville Power Administration delivered almost 2,000,000,000 kilowatt-hours of Columbia River energy to war industries in the area. Shipyards, naval stations, aluminum, magnesium, ferro-alloys, ferro-silicon, and war chemical plants and allied industries were energized by public power produced by the Bonneville-Grand Coulee system. Indeed, these vital war establishments came into being only because the Bonneville Power Administration made Columbia River energy available.

Thus one of your administration's great peacetime projects became one of the most productive facilities possessed by this country for war. It is no idle assertion to say that the great war output from the Northwest—planes, metals, chemicals, ships—would have been virtually impossible had it not been for this progressive power system. Bonneville and Grand Coulee dams, with their integrated network of transmission facilities controlled by the Bonneville Power Admin-

istration constitute one of the greatest power sources in this Nation. That source has been fully harnessed for war.

Not only is this Federal hydroelectric development on the Columbia River paying for itself as a war facility, it is, I am happy to report, beginning to pay back substantial amounts to the United States Treasury. Power revenues of the system during the 1942 fiscal year were three times the 1941 figures. On the basis of executed and assured contracts, the Administration's revenues in the 1943 fiscal period will more than double the 1942 income. This power system, you will recall, was once described as a "white elephant" by those who opposed its building on the ground that it would have no field for the disposition of the power to be generated.

Another record established by the Bonneville Power Administration is worthy of mention. Although the great war metals and production plants established in the Northwest were completely new, and thus required new construction of transmission facilities, power was waiting at the plant sites in every case by the time that the plants were ready to use it. In no case was there any delay in Northwest war production because of failure to have Columbia River power at the locations on time. The import of this accomplishment becomes clear when one considers the heavy amounts of power involved and the difficulties attendant upon heavy construction during a time of war, as well as the lack of necessary power in many important industrial areas in other parts of the country.

During World War I the resources of the Pacific Northwest were not developed as they are now. At that time, the hydroelectric projects on the Columbia existed only in the dreams of far-sighted men, and the Nation could not count on this area for the enormous war metals and weapon production that is now flowing from the Northwest. Now the call upon the Bonneville Power Administration for electric energy for war and for distribution by public agencies has proved both the wisdom of the construction of the Columbia River dams and of the basic planning of the Bonneville transmission system.

The Division of Power

Established April 18, 1941, to coordinate the Department's power-production activities, the Division of Power worked toward that end with emphasis on power for war throughout its first complete fiscal year.

Our principal objectives were the development of additional power for war; the maximum use of available power in war production; the construction of new power facilities which require a minimum of critical material and which can be completed in time for war use; the location of war plants on sites where low costs to war industries

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and development of a balanced economy in the region of the plant would result, and where operations might continue after the war.

The Division has worked toward pooling the Department's power resources in ways that would result in the greatest efficiency and in the availability of maximum amounts of power in the various areas. It has insisted that power from Departmental projects be sold for war uses at the lowest possible rates in order to hold the cost of war essentials produced by the power at the lowest feasible level.

Arrangements to supply approximately 200,000 kilowatts to the big magnesium plant near Las Vegas, Nev. were worked out with the Bureau of Reclamation, the allottees of Boulder power and Defense Plant Corporation. This transaction constitutes one of the largest single sales of power ever made to a consumer.

Hetch-Hetchy power was turned to war use. In November 1941, a 17-year-old dispute regarding the disposition of this power in accordance with the terms of the Raker Act culminated in the rejection by the city and county of San Francisco of a charter amendment which precluded the civil use of the power which had been under consideration. Largely through the efforts of the Division, the Federal Government built an aluminum reduction plant near Modesto, and Hetch-Hetchy power was sold to the plant.

These are but highlights of the Division's activities. It also worked with the War Production Board for the installation of additional generators on Columbia River projects, assuring their maximum war-usefulness. It has kept war agencies informed about the quantity and location of available departmental power. It has acted generally as a liaison office between various agencies of the Department and the war agencies, and has operated within the Department as a clearing house for the increasing body of problems incident to departmental power activities.

During the fiscal year the installed capacity of power projects under the jurisdiction of the Department was increased by more than 500,000 kilowatts, bringing the total to almost 1,800,000 kilowatts. This represented an increase of 41 percent in power installations.

The Geological Survey

The work of the Geological Survey for the year was determined largely by a redistribution of essential metals among nations which was made necessary by the war. When Germany invaded Norway in April 1940 the Anglo-Saxon peoples controlled approximately 75 percent of the world's metal supply. Germany controlled a small percentage, and Japan a negligible portion.

Within a few months, Germany acquired the iron of Norway, the coal and iron of France and Belgium, the copper and aluminum-bearing

ing bauxite of Southeastern Europe, the metals of the Balkans and, by the force of international circumstances, could draw upon the product of Sweden's rich iron mines. On the other hand, the amount of metal available to us in other countries was reduced by Axis raids on our shipping, the disruption of war, the lack of transportation, and other concomitant factors.

The Geological Survey thus entered the fiscal year with our sources of metals for war greatly reduced, and those of our potential enemies correspondingly increased. Then Japan went into the war and swiftly captured the world supply of tin in the Dutch East Indies.

Inevitably a major activity of the Survey involved a diligent search for more minerals for war in the areas still accessible to us. Such a program, launched the previous year, was greatly enlarged and carried on throughout the United States and in Alaska as well as in Cuba, Mexico, and other American Republics, in cooperation, in many instances, with the Bureau of Mines.

This search, which is still being vigorously pursued, has a twofold purpose: The first, to make available more of the high-grade ores, customarily utilized in this country, by reevaluating old deposits and finding new ones; the second, to amass geological data which have to be available before we can recover low-grade ores, previously unused, but which must be used if we are to turn out enough munitions and implements of war to insure victory.

It is too early to measure the success of so comprehensive a program, but some encouraging results can be reported. Basic data essential to the planning of an iron and steel industry in the West have been provided. Large scale development of manganese deposits in Arkansas has been undertaken. Tungsten was discovered in an Idaho mine which, by the end of the fiscal year, was the Nation's largest single tungsten producer. Largely on the strength of previous findings, production of chromite began this year from the abundant deposits in the Stillwater District of Montana. A new mill there is turning out 150 to 175 tons of chemical grade chromite concentrates daily.

Elsewhere profitable work has been carried on with respect to these and other strategic metals—bauxite, high-grade aluminum clays and alunite (potential sources of aluminum), magnesite, quicksilver, beryllium, tantalum, lithium, and others in the United States and Alaska; manganese, nickel, chromite, tungsten, antimony, quicksilver, chrome, tin, and vanadium in Cuba, Mexico, and other American Republics.

Discovering and revaluating deposits of high-grade minerals has led to an indispensable contribution to victory. These basic metals and alloys are forged into munitions and implements of war, or into machines for war manufacture. But the ultimate worth of complete

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data on deposits of low-grade ores is not so definite. Many of them have been evaluated qualitatively and quantitatively, but their effectiveness against the enemy depends upon how quickly and how extensively they can be put to use.

There are some encouraging signs. Plans now well underway for war manufacture from some of the low-grade iron deposits in the West appear certain to materialize. But general use had not been assured at the end of the fiscal year.

The Geological Survey also placed a war emphasis on its numerous fields of work which are unrelated to the search for minerals.

Data on water resources, regularly gathered and published by the Survey, are doubly valuable in time of war. Rapid expansion of the national war plant, requiring large water supplies for processing, and to accommodate concentration of troops and of war plant workers, requires knowledge of the quantity and quality of water available at these points of development. Reports and consulting services have been furnished on surface and ground-water supplies for war purposes at about 1,700 places in the United States and in certain islands of strategic importance, as requested by the War and Navy Departments, the War Production Board, and other war agencies.

These reports have related to the water supplies for Army cantonments, naval stations, munitions plants, largely increased local concentrations of population producing war supplies, and for other war activities. Surveys were made for the Navy Department of emergency supplies from wells in case of attack, and summaries of water conditions, on the surface and underground, throughout the United States were prepared each month for the use of the agencies in charge of water-supply and power activities related to the war.

The war program was furthered also by the Geological Survey's conservation work—its surveys and investigations of water and mineral sources of the public domain, and its supervision of certain phases of mineral- and power-production on these lands. Production of coal, petroleum, natural gas, natural gasoline, butane, potassium salts, and phosphate rock from public lands was substantially greater in 1942 than in 1941. Additional lands were coming into production, and an unusual amount of prospecting was underway. Production of lead, zinc, and coal also increased on Indian lands, and there, too, extensive prospecting was in progress.

Numerous mechanical devices constructed during the year have greatly accelerated the production of maps for the Air Corps. The most important are the Lewis rectoblique plotter, the Sketchmaster, and the Lucidagraph. A double photoalidade and a stereoblique plotter are now being developed. By means of such instruments, aerial photographs taken at an angle of approximately 30° below the

horizon may be converted into the kind of maps required for the navigation of air forces over previously unmapped or inadequately mapped areas.

The Office of Solid Fuels Coordinator for War

In a letter dated November 5, 1941, and addressed to me, you called attention to the need for "efficient and carefully coordinated development, production, distribution, utilization, transportation, and handling of solid fuels" to assure their availability when and where needed for military and civilian use, and requested me, as Secretary of the Interior, to serve as Solid Fuels Coordinator to help achieve these objectives.

The Office of Solid Fuels Coordinator was established and quickly began functioning, using, for the most part, the staffs, facilities, and data of the Bituminous Coal Division and the Bureau of Mines, thus effecting economy in time and funds, instead of building a large new organization.

Immediate steps were taken to organize the industries dealing with the coal supply on a war basis. Representatives of the coal mining industries, coal transporters, distributors, dealers, and mine labor met with me on December 18, 1941, and the groundwork for organizing the industries was laid. Cooperation continues through a council of 18 members, representing the industries concerned, mine labor, and the public.

Estimates made early in 1942 indicated that the Nation would require 550,000,000 to 570,000,000 tons of bituminous coal, approximately 60,000,000 tons of anthracite, and about 70,000,000 tons of coke during the calendar year of 1942—amounts far exceeding normal production. Later experience indicates that these estimates are in line with actual requirements.

The Coordinator, in cooperation with industry and other Government agencies, is taking various steps in an effort to forestall any emergency as to the coal supply because of wartime changes and deficiencies in manpower, equipment, and transportation.

Although there are many difficulties yet to be surmounted before the Nation can be assured of adequate wartime fuel protection, it appeared as of June 30, 1942, that it would be possible to provide adequate coal of some usable type to keep homes warm and industry operating throughout the winter, provided that dealers and consumers would order their coal sufficiently early to enable mines and carriers to make full and continuous use of their manpower and facilities throughout the warm season.

To bring about public cooperation, a "Buy Coal Now" campaign was launched in the spring of 1942 in cooperation with other Govern-

ment agencies and with industry. In general, public cooperation was excellent, although in many cases, consumers failed to make full use of their opportunities to obtain bituminous coal for storage. Restrictions in the production of anthracite, however, threaten to prevent the storage of the full amount of hard coal that consumers are ordering.

However, as of June 30, 1942, coal in general was being produced and transported at a rate much higher than was demanded by normal seasonal requirements, and a great deal of it was going into dealers' and consumers' storage as wartime fuel insurance.

The Bituminous Coal Division

It is anticipated that the war will necessitate the greatest production of bituminous coal in history. The stabilization of coal markets under the Bituminous Coal Act of 1937, as administered by the Bituminous Coal Division, is one of the principal factors which is enabling the coal mining industry to meet its responsibility for supplying the Nation with the principal source of the energy needed to forge the implements of war.

For 14 months prior to Pearl Harbor the industry enjoyed stable markets and fair trade practices by virtue of the minimum prices and marketing rules and regulations promulgated under the act. This gave it the incentive and the opportunity to improve its capital strength and better to prepare itself for the challenging task of meeting wartime fuel requirements.

It is essential that the stabilization of coal markets by minimum price regulations be continued vigorously as a measure of immediate importance to fighting the war. It will also aid the prevention of post-war chaos in this basic industry, such as followed World War I.

At the present time, the stabilizing effect of minimum price regulation makes it possible for the industry to plan the orderly production and distribution of coal in such a way as to obtain the maximum use and efficiency of the limited manpower and equipment available for producing and transporting coal in time of war. It prevents the recurrence of pressure buying, particularly by large industrial consumers; curbs cross-hauling and dumping, and constitutes a bulwark against other practices and conditions peculiar to the coal mining industry which would promote waste of the means of producing, transporting, and distributing this vital war fuel.

The demoralization of the coal mining industry which followed World War I, which involved destructive price cutting and undesirable trade practices on a Nation-wide scale, caused tremendous financial losses. It precipitated violent disturbances between mine owners and their employees, and seriously weakened the industry's capital structure. These conditions had an undesirable effect upon the general

economy of the Nation in addition to perpetuating the more acute situation in the coal mining regions. They persisted even in times of general Nation-wide prosperity, and continued until minimum prices and marketing rules and regulations were made effective on October 1, 1940. The continued stabilization of this industry under the Guffey Act will make a large contribution toward speeding general post-war stabilization.

The Bituminous Coal Division is making other great contributions to fighting the war. It is serving as a central source of coal statistics, and in many instances is providing technical advice, for other Government agencies dealing with wartime fuel problems, including the Coordinator of Solid Fuels, the OPA, the War Department and others.

The establishment by the OPA of anti-inflationary ceilings on coal prices was a task which obviously might have puzzled experts for many months. It was rendered relatively simple because the Division had classified all soft coals and was able immediately to furnish data on production costs and maximum price application and to give other technical assistance. The Division is continuing to give substantial aid to OPA in handling compliance matters and in making adjustments to the schedules.

The National Park Service

As trustee of much that is great in America, the National Park Service has endeavored to harmonize its activities with the war program while holding intact the things entrusted to it.

The stewardship of the Service extends over areas of outstanding beauty, scientific interest, historical significance, and, more important, the uniquely American concept under which the national parks are preserved inviolate for the present and future benefit of all of our people.

Lumbering, mining, grazing, and other exploitation of national park areas have been urged as a necessity of war. The Service has tried to measure the degree in which necessity justifies destruction of irreplaceable values and has acted accordingly. With due regard for its conservation responsibilities the Park Service has nevertheless rendered valuable service within the war program.

One hundred twenty-five permits have been issued to the War and Navy Departments and other war agencies to make use of National Park Service lands, buildings, and facilities. Salt for use in magnesium production has been made available from National Park property. Steps were taken to establish fire-lookout and air-raid warning towers immediately after war was declared, and much besides has been done in furtherance of immediate war aims.

Equally vital, if not so spectacular, the Service has helped to sustain national morale in the exercise of its usual functions. Special reduced rates for men in uniform were continued in effect in federal park areas, and an estimated 650,000 of them visited these inspiring monuments to America's present and past greatness during the year. Several thousand British sailors found rest and a change of scene while occupying group camping facilities in recreational demonstration areas and vacated CCC camps. Service technicians helped to plan and to direct the construction of 33 army rest camps in 23 States and the District of Columbia—places in which service men on leave might find rest and relief from training.

Instead of increasing as usual, travel to the National Parks decreased 30 percent this year because of limited motoring to conserve gasoline and rubber. The decline was greatest at Yellowstone, Glacier, and Crater Lake, and least at Sequoia, Yosemite, and Carlsbad Caverns which are closer to metropolitan centers.

While many activities of the Service were curtailed or deferred, historic areas were kept open and visiting time was lengthened.

The General Land Office

The General Land Office responded to the national war needs during the fiscal year by withdrawals of public lands for military and other war uses, by seeking new outlets for various resources on the public domain, by making public lands and their resources available for use in war industries, by facilitating the search for strategic metals, and by other activities, including many in close cooperation with other agencies.

More than 7,000,000 acres of public lands were withdrawn for military purposes, including areas for aerial bombing ranges, antiaircraft fields, combat training lands, artillery practice grounds, air navigation sites, flying schools, ammunition storage, and ordnance depots. This year's withdrawals bring the total area of public lands withdrawn for military use to 13,000,000 acres.

In the development of strategic minerals the General Land Office cooperated with the Defense Plant Corporation, Metal Reserves Co., the Reconstruction Finance Corporation, and other agencies. Opening reserved mineral deposits to exploitation has made available large quantities of tungsten, manganese, and other minerals. The potash reserves in New Mexico and California, operating under lease, now provide large supplies of potassium at less than one-sixth of the price paid for potassium during the first World War.

Studies are under way to determine possible new uses for resources on the public domain. New values are being found in minerals, natural vegetation, and other resources which heretofore were con-

sidered of little importance or which were not known to exist. Commercial quantities of strategic minerals may be developed from previously unused deposits, and such materials as fiber, rubber, turpentine, and resin, may be produced from desert shrubs.

Authorized by recent legislation to lease or sell lands in the public domain for use in connection with specified war manufacture, I have issued regulations under which the Commissioner of the General Land Office will negotiate transactions providing land to be used for its yield of timber, sand, gravel, and stone; and as factory sites, housing development sites for war workers, and as expansion areas for plants bordering the public domain.

It is possible that yucca, growing on public lands, may be used as a substitute for fibers that can no longer be obtained from the usual sources. Information also was gathered on the possibility of helping to relieve the rubber shortage by furnishing lands for the raising of guayule, and by making rabbit brush on public lands available.

Fire prevention and suppression activities have been greatly increased. Through the work of the Oregon Forest Defense Council, plans and policies were adopted which will greatly increase the effectiveness of fire suppression agencies in coping with forest fire conditions—even the abnormal conditions that exist in wartime. Work also continued in the suppression of outcrop coal fires which were threatening destruction of a very large amount of the Nation's coal resources in the vicinity of Little Thunder Basin, Wyo.

The Office of Land Utilization

The proper management of land, important in peacetime, becomes even more vital in war. This Department has jurisdiction over 625,000,000 acres of public land in the United States and Alaska. In order that this great domain might make its maximum contribution to the war, the Office of Land Utilization has directed close coordination during the year of all land management programs in the Department. An immediate result has been an increase in timber production from Departmental lands and an improvement in western range lands which has fitted them for greater sustained production of beef, leather, wool, and other livestock products. An increased output from the land of minerals, timber, food, and raw materials was made possible without compromising sound conservation practices.

Developmental programs were curtailed in accordance with the needs of war for money. At the time of Pearl Harbor, a \$2,178,000 soil- and moisture-conservation program was under way. This activity promptly was restricted to the projects offering the quickest return in increased production of necessary materials. The balance of the projects were postponed.

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Burdens of protection also were assumed by the Office of Land Utilization. Working closely with the Office of Civilian Defense, the OLU took over the Facility Security Program which involved the establishment of a nonmilitary front against subversive action, forest and range fire hazards, and other forms of sabotage aimed against war production.

The Grazing Service

In addition to continuing its program of a wise use and development of Federal grazing lands during the fiscal year, the Grazing Service facilitated military use of the range.

Proving grounds were provided for thousands of bombers and tanks, and nearly 3,500,000 acres of Federal grazing districts were converted into training areas, bringing the area withdrawn for military use in 2 years to 8,500,000 acres. Despite these withdrawals, livestock production was kept at a high level.

Range improvement was confined, with few exceptions, to water development, construction of trails and feeder roads, revegetation, maintenance, and other activities requiring little or no critical materials.

Range reseeding experience furnished a valuable guide to future methods. A total of 199,670 acres was reseeded in 1942, compared with 66,000 acres in 1941. Nineteen million acres of range lands were surveyed and a recheck survey was accomplished on 10,000,000 acres during the year.

The Grazing Service became the first bureau of this Department to be decentralized from Washington. Headquarters were transferred in August 1941 from Washington, D. C., to Salt Lake City, Utah, the hub of the Federal range territory.

The Fish and Wildlife Service

The prudent use of our wildlife resources encouraged in the past by the Fish and Wildlife Service paid dividends this year as the Nation sought maximum returns from its investment in conservation. The Fish and Wildlife Service has done much to produce more abundantly for war from the resources that it administers, but it has enforced the principle of increased production to the extent consistent with conservation.

Nearly all of the war agencies have urged the delivery of more products derived from wildlife—more fish for the armed forces at home and abroad, for our outposts and for our allies; more vitamins from fish, more fish liver oils, more fur and fiber and food for war. We have given sympathetic assistance, but we have always looked

first to new sources to tap, to fuller use of resources at hand, and for means of spreading customary production further.

To increase the home supply of fish, we have advocated production in farm ponds that now flourish in the South. To augment the commercial catch, we have urged the industry to land species and sizes which previously were caught and discarded as unpopular, though suitable for table use. We have provided data on seafood production in the various theaters of war so that our expeditionary forces might find a local supply, thus diminishing their demand upon American resources and freeing shipping space for arms and munitions.

These are a few typical means by which we have tried to increase present fish production without impoverishing the future.

A program to use less material needed for war has paralleled our program for producing more food. With some success we have experimented with canning plates requiring reduced amounts of tin, and with noncanning methods of fish preservation. We have assisted in the release of fishing vessels for war use, and have facilitated the use of net-manufacturing machines in making camouflage nets.

We have been active in the field of predator control to conserve food and raw materials. In a single instance organized control reduced sheep losses from 7 percent to less than 2 percent. This is a considerable contribution when it is considered that the Army estimates a need for 100 pounds of scoured wool for each soldier during his first year of service, and taking into account also that 15,000,000 shearling pelts are needed to line aviators' coats.

In this report you will find accounts of the Fish and Wildlife Service rendering many war services other than those which its title indicates that it might perform. Among these are services related to the control of disease, often among concentrations of troops; the prevention of stream pollution, which was increasing because of hurriedly expanded mining and manufacturing operations, and to services related to food-storage in England.

All of these activities have been better correlated and their results have extended further because of the relationship between the Fish and Wildlife Service and the Office of Fishery Coordination. This Office, operating under my jurisdiction, is charged with mobilizing for war all of the industries concerned with harvesting, preserving, and distributing fish and fish products. The key personnel of the Service's Division of Fishery Industries and that of the Coordinator's office is identical.

The Office of Indian Affairs

The Office of Indian Affairs has dealt with numerous and important problems of war. After the attack on Pearl Harbor, all of the Aleutian Islanders west of Dutch Harbor were evacuated according to plan, and the removal of these people from their homes raised many problems for

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this Office. It helped to relocate them, to provide relief and medical care, and to plan their future self-support.

It was also active from the beginning in the relocation of the West Coast Japanese, and is administering the largest of all evacuee centers. At the request of the War Relocation Authority, the Office of Indian Affairs assigned personnel and equipment to establish centers for large numbers of Japanese and their American-born families. Blocks of Indian land also have been requisitioned for military use, and the removal of Indian families, which resulted in some instances, constituted a direct war service for the Office.

Charged with grave responsibilities toward the Indians of the United States and the natives of Alaska, we have seen the war come very close to both—to the very doorsteps of some among the latter group in the Aleutian Islands. In both the United States and Alaska the response of these minorities to the challenge of war has been excellent.

The Alaskan natives have already defended their homes and given their lives on their own soil in this war for freedom. In the United States, Indian enlistment in the armed forces increased rapidly after war was declared, and on June 1, 1942, there were 7,500 of them in the service. Their most distinguished soldier, thus far, has been the late General Tinker, an Osage, lost in the battle of Midway on a daring air mission bravely self-undertaken.

At least 6,500 Indians who received vocational training under the CCC program are now in the service, and others are applying the skills that they learned in shipyards, airplane factories, and munitions plants.

The natives of Alaska are serving there in the United States forces. The skill of these men and their intimate knowledge of the country are of extraordinary value.

Evidence of the Indians' will to victory has come from even the remotest reservation. On several occasions groups of Indians have arrived at agency headquarters, each man with his gun, ready to proceed immediately to the scene of the fighting. The Crow Tribe in Montana offered the Government all of its resources and manpower. Indians in the United States and Alaskan natives alike have been generous buyers of war bonds.

During the fiscal year much has happened to strengthen our policy toward the Indians. War conditions are hastening the maturity of tribal self-government; the Indians are continuing the practice, begun several years ago, of investing tribal monies in the land; the courts have tended to sustain the tribes' rights in certain lands against conflicting claims and despite the fact of forcible removal, and to uphold their right to fish in accustomed places without payment of State license fees.

The Inter-American Indian Institute was formally created March 25, 1942, in Mexico City. This organization is the official agency for

the development of collaboration among the American nations on matters affecting the more than 30,000,000 Indians who live in the Western Hemisphere, and it has received support and encouragement from the Service.

The Division of Territories and Island Possessions

Although all of the American people have felt the effect of war, the people of our territories and island possessions have literally been living in the front lines. Two of the territories, Alaska and Hawaii, have been under enemy attack. Puerto Rico and the Virgin Islands have been under the heavy hand of maritime siege.

The response of the citizens in our territories to the trials and perils of war has been magnificent. In some instances they have been driven from their homes; they have had to accept sharp restraints; they have had to make profound readjustments in their lives and affairs. But the nearer the proximity of the enemy, the further in his blows the greater has been their determination to crush him once and for all, regardless of the cost to themselves.

The attack upon Pearl Harbor made Hawaii the center of an active combat zone. A well-organized civilian defense program took its place alongside of the military operations. Funds were provided for civil protection, health, sanitation, hospitalization and other civilian defense necessities, and a representative of my office proceeded to Honolulu to aid, temporarily, in the administration of the program. With the full-fledged cooperation of civil and military authorities a comprehensive program was undertaken to assure adequate protection for the population in the event of further attack.

The report of the Governor supplies the story in full detail. The willingness of all elements—citizens, plantation operators, factory owners, transportation employees, contractors, builders and utility workers—contributed to the prompt execution of a protection program that should serve as a model for Americans under fire.

Subsequent developments, as the life of the islands was abruptly switched from peace to combat, have had a disrupting effect. The change from normal, revenue-producing shipping to the movement of war supplies has adversely affected Territorial finances. Necessary combat zone restrictions on the daily life have caused complications. There is a shortage of housing, and the labor problem is far from being solved. No one has any doubts, however, as to the ultimate fortunate outcome of these matters.

Alaska also found itself in the front line. Close to the top of the world, where airline distances telescope amazingly, the Alaskans were keenly aware of their nearness to the enemy. They were awake, also, to the assiduity with which the Japanese had studied and

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charted Alaskan waters, explored the coastline and penetrated the Aleutian Islands. It was no surprise to them, therefore, when bombs fell on Dutch Harbor. They had expected them earlier.

In the evacuation of native populations from the various islands the Office of Indian Affairs played a large role. Several hundred natives and whites were forced to leave their homes and ancestral hunting areas and were moved to the mainland. Evacuation camps were established and the first American refugees were made completely comfortable in new locations. There is reason for great pride in the way in which this job was handled.

Severe problems were created for Alaska by the influx of large numbers of troops and the establishment of long-overdue military bases. In great numbers construction workers were suddenly dumped upon undeveloped areas, causing many difficulties in social adaptation and adjustment. Boom times transcending the days of the gold rush were created. Serious difficulties of supply had to be coped with.

Alaskans were prompt to volunteer for military service. Indians and Eskimos appeared with rifle in hand. The knowledge of the Alaskans of their own territory was put to excellent use. In countless other ways Alaskans lived up to their reputation as alert, enterprising Americans, able to cope with situations which might be dismaying to those of less tough moral fibre.

In Puerto Rico and the Virgin Islands, in the vital Panama Canal defense zone, the people and their governing officials realized the immensity of the war and the problems of our involvement more quickly than those facts were grasped on the continent.

In the Virgin Islands, our Easternmost outpost, the program for both civilian and military preparedness was especially intense. When war came, this was well advanced. James M. Landis, Director of the Office of Civilian Defense, later recognized this when he said, "We must put into practice in the Nation much of what these islands . . . have already done."

Such strength as we have shown in the off-shore areas has gained valuable time for us, especially in the instance of possible eventual enemy occupation. Much of our strength lay in the loyalty of the inhabitants, but much also was the result of your administration's farsightedness. Pre-war controls over shipping, trade in war-essential commodities and other activities strengthened our position.

The problem of supply for Puerto Rico continues to be acute. It is, without question, the most severe single problem that we face in any of the territories. Every effort is being made to obtain greater tonnage for the island, and in this all agencies of the Federal and Territorial Governments are cooperating to the fullest. The complete solution will come only when success in arms will release greater numbers of vessels for assignment to this service.

The Office of the Petroleum Coordinator for War

While the Office of the Petroleum Coordinator for War (now the Petroleum Administration for War) is not a part of the formal organization of the Department of the Interior, I wish nevertheless to mention this activity briefly in this letter. What the Nation would have done to handle its oil problem under actual war conditions had it not been for the earlier work of the Office of Petroleum Coordinator, I cannot guess. The story of the successive problems created by the disruption of normal petroleum transportation and supply pattern is too fresh in memory to bear repetition here. Although the warnings we issued in the summer of 1941 were largely ignored, and the restrictions which were imposed met with derision and a flood of misrepresentation, the correctness of our actions came to be generally recognized. Now, with war demands for specialized petroleum products increasing daily, it is clear that efforts to provide the aid necessary for war were started none too early.

In this connection, I want again to emphasize that the remarkable results that have been brought about would have been impossible without the wholehearted willingness of the oil industry to work in full partnership and understanding with the Federal Government. Too much credit cannot be given to the members of that industry. Traditional competitive practices have been laid aside, and many individual companies have willingly accepted severe financial loss to make an integrated handling of the oil problem possible. There is no such thing as "business as usual" today in the oil industry. Normal patterns have been junked for the duration, and the handling of petroleum from the well to the delivery of the finished product is replete with innovation. As one member of the industry puts it: "The difficult we do at once; the impossible takes a little longer."

Three principal tasks were faced by the OPC. They were to provide an adequate supply of petroleum and specialized products for our armed forces; for the United Nations, and for our own civilian front. It has been only by the use of considerable ingenuity that we have succeeded as well as we have. With the assistance of the industry, we will continue to dispose of the difficult and to perform the impossible.

Conclusion

Although this letter is optimistic in tone, the facts speak for themselves. The series of disasters inflicted upon the United Nations by their enemies depressed men's spirits everywhere, and a recounting of accomplishments such as this may seem somewhat trivial and academic when judged against the somber backdrop of the world today. And yet, as I analyze what this one Department of the Federal Government

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has accomplished in the face of handicaps, there is ample cause for grim cheerfulness.

We can appraise our progress honestly and find that we have moved forward. Under the general tendency to magnify our defeats and belittle our accomplishments because they seem small against big events, we might not regard what we have done as significant. We have had failures, many of them. We have had lapses of imagination, and of concept, and failures of execution. But on the asset side, we have accomplished some truly worth-while things. So far as this Department is concerned, we intend to proceed with our work; to persist in what we think is the right course, and, with the greatest energy possible, proceed with the sensible development of conservation and supply programs that, in the end, will win the war.

Sincerely yours,

Harold L. Ickes

Secretary of the Interior.

(Note.—*Specific details relating to individual projects and to power production normally contained in this report have been deleted at the request of the Office of War Information and the War Department*)

Bureau of Reclamation

JOHN C. PAGE, Commissioner

BASED on the sound theory that soldiers and civilians fight best when properly fed, and victory is surer, swifter, Reclamation operations during the 1942 fiscal year were aimed at providing foodstuffs for men behind the guns and machines as well as hydroelectric power for the guns and machines themselves.

For a short conflict or a long pull—a war of attrition—this dual objective symbolizes the straight thinking of a democracy at bay.

The year's results from Reclamation activities in 16 Western States are impressive. Four decades of sound engineering work enabled the Bureau to assume a vital role in the Nation's war machine. Outstanding was its contribution of hydro power—potent energy that turns the machines that turn out the guns.

In the Pacific Northwest and Southwest giant Reclamation plants were the bulwark behind industries working at war tempo or mushrooming into production of war material. Power poured out of these plants and others for mining and manufacturing; for copper, steel, aluminum, magnesium; for bombs, planes, and ships.

Simultaneously, reservoirs on Reclamation projects furnished water to cities and their industry, to military establishments, their training centers, their airfields.

Stored water also irrigated 3,500,000 acres of productive land. Food, forage, and fiber were produced on the strategically located 45 irrigation projects in operation in the West. Farmers were urged to plant and to harvest, to raise cows, beef, and poultry. Irrigation district officials collaborated with the Bureau in an effort to get the most from high-production Reclamation farms.

Expanded production of food, forage, and fiber was recognized as necessary to supply the demands of the United Nations, to meet

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domestic, civilian, and military requirements. Increasing civilian and military population and the urgency of conserving transportation emphasized the necessity of making the western half of the United States self-sufficient in food. This can be achieved only through an accelerated Reclamation program.

Geared to the over-all demands of the war, the construction of purely irrigation facilities made progress despite retardation by shortages of steel and other critical materials controlled by the War Production Board. Substitutions of noncritical material and concentration on excavation and other work enabled the Bureau to advance this work further than otherwise would have been possible.

Because of curtailed Work Projects Administration and Civilian Conservation Corps contributed labor, the water conservation and utilization program to stabilize the Great Plains and other semiarid areas was being redirected into a reserve against future contingency. Projects under construction are being advanced with all the speed possible; many others are being investigated and are being tagged for construction the moment war or postwar needs give the signal to go ahead.

Set in motion also was a still larger program for lessening the shock of postwar dislocation. Under investigation were 209 river basins and potential irrigation or multiple-purpose projects in 17 Western States. The investigations will produce an inventory of water resources and point the way to their economical and effective use in a region where water is the most precious natural resource and the basis for its economic expansion.

From studies that have been completed or are well advanced, the Bureau was selecting for a reservoir of public works, in accordance with the President's direction, a minimum of 50 feasible projects. This irrigation and multiple-purpose construction can be launched promptly at the conclusion of the war. Demobilized soldiers, sailors, and marines will require employment in useful occupations. Industrial workers released from war factories will want work close to their original homes. This shelf of projects, and the remaining construction on great undertakings like the Columbia Basin Reclamation project in the State of Washington, will provide that work.

In the Economic Front Line

As the fiscal year closed multiple-purpose irrigation projects engineered by the Bureau provided the hydroelectric power for war industry, assured a stable supply of water for essential agriculture and for cities and industry, and also represented a main source of manpower in the West—now in the economic front line. Once unpopulated and unproductive areas, former wasteland, after 40 years of sound Recla-

irrigation development were highly productive regions of farms and factories, towns and cities, all contributing their strength to the war.

The 81 reservoirs in operation on Reclamation projects had an active water storage of more than 47 million acre-feet—15,000 billion gallons—available for power generation, irrigation, and domestic and industrial needs. A 6-million-acre-foot increase in storage over last year illustrates the foresightedness of the Bureau in undertaking construction long in advance of an emergency.

Of 73 projects in operation, under construction, or authorized, 45 were producing power and supplying water for irrigation, municipalities and war industries. Twenty others were under construction. Nine were authorized but work was deferred because of the war. Of the 45 projects in operation several had important features still under construction.

More than 95 percent of the construction costs of these projects is reimbursable under the Reclamation law or other legislation. The remainder is allocated to flood control, aid to navigation, or to non-reimbursable labor costs.

Power Gain

The hydroelectric development on Reclamation projects as of June 30, 1942, was installed in 28 power plants on 17 projects in 11 States.

A tremendous power increase during the year was due chiefly to the installation of great generators in the Grand Coulee Dam power plant, Washington. In the Boulder Dam power plant, Arizona-Nevada, also, a big generator was installed and placed in operation, to make by far the most powerful array of dynamos ever assembled and synchronized into action. An addition at the Minidoka plant in Idaho and another at the Spanish Fork development on the Strawberry Valley project in Utah completed the year's installations.

But being hurried to completion as the year closed were more generators at Boulder, Grand Coulee, and Parker (Arizona-California) Dams due to start operating within 6 months.

Following the recommendation of the Bureau, the Congress appropriated funds for the completion of construction plans for a steam plant on the Central Valley project in California. The plant will firm Shasta and Keswick power and make the output more valuable. It will assure a larger net revenue to assist in repaying irrigation costs. The Congress also provided funds for the construction of a transmission system to carry power from the California project's Shasta and Keswick Dam power plants to market.

In the war program of the Department of the Interior for the development and utilization of western mineral resources, the Bureau recommended the construction of 17 new power projects in strategic-

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ally located areas of 11 States. Included in the proposal were steam plants. The remainder were hydro installations.

Aside from the generation of power, and the release of water itself for domestic and industrial uses, the regional production of food, forage, and fiber by Reclamation projects in the West supplied urgent needs. This production reduced the burden on transcontinental railroads and highways for the movement of men and equipment. It meant speedy delivery of supplies, and the saving of freight cars of steel for rails and equipment, of fuel for engines, and of gas, oil, and rubber for trucks.

Water, prime essential in war, was provided during the year for municipal areas of 2,500,000 population. Extensive industrial and military concentrations were located in the areas.

The Boulder Dam system on the Colorado River in the Southwest provided water for Los Angeles and 12 other cities of the metropolitan area of southern California. It supplied both water and power to the huge new magnesium plant in Nevada near Boulder Dam.

The Rio Grande project in New Mexico and Texas supplied water to the city of El Paso to make possible more extensive military operations. The Contra Costa canal on the Central Valley project provided water for industries in Pittsburg, Calif.

Work was rushed on the Provo River project in Utah to provide water for a large steel plant and for Salt Lake City and Provo. Important military and industrial concentrations in this Utah area, with increased population, are draining the limited water supplies for domestic and agricultural purposes.

Other Reclamation projects also were under construction to provide municipal water supplies. The Altus project in Oklahoma and the Rapid Valley project in South Dakota will give Altus and Rapid City new reserves. The increase in Army personnel and population made the added water supply essential.

Irrigation Crop Returns 35 Percent Higher

The gross value of food, forage, and fiber produced in the calendar year 1941 on land served with Reclamation water was \$159,885,998, a 35 percent increase over the \$117,788,677 of 1940. These values do not include the livestock fattened on Reclamation projects, nor dairy products such as milk, butter, and cheese, and poultry and eggs—which would increase totals perhaps more than 25 percent. Nor do they include returns from areas irrigated by the All-American canal and 5 other supplemental water projects.

TABLE 1.—Reclamation area and average crop return, calendar year 1941¹

	Irrigable area ²	Irrigated area	Area in cultivation (paying area)	Crop values	
				Total	Per acre
	<i>Acres</i>	<i>Acres</i>	<i>Acres</i>		
Regular projects, total.....	2,432,065	1,868,808	1,846,593	\$99,865,794	\$54.08
Storage projects, total.....	418,208	330,371	331,695	10,534,013	31.76
Storage projects, ³ total.....	667,105	(⁴)	(⁴)	(⁴)	(⁴)
Special and Warren Act lands, total.....	1,398,338	1,240,204	1,202,172	49,486,191	41.16
Grand total, 1941.....	4,915,716	¹ 3,448,383	3,380,460	159,885,998	47.30
Grand total, 1940.....	4,835,693	3,500,070	3,316,030	117,788,677	35.52
Increase or decrease 1940-41.....	+80,023	-51,687	+64,430	+42,097,321	+11.78

¹ A detailed table of area and returns by individual projects is available on request from the Bureau of Reclamation, Washington, D. C.

² Area for which the Bureau is prepared to supply water.

³ Estimated irrigated area on projects with unreported crop returns is 250,000 acres, bringing the grand total of irrigated land in 1941 to approximately 3,698,000 acres.

⁴ Crop results not reported.

The cultivated area on regular and storage projects rose from 2,138,927 in 1940 to 2,178,288 in 1941, with crop values of \$80,098,196 and \$110,399,807 respectively (table 2). The cultivated Warren Act lands supplied with supplemental water increased from 1,177,103 to 1,202,172 acres with respective values of \$37,690,481 and \$49,486,191.

In acreage, hay and forage for livestock were the most important. Other products included vegetables and truck, fruits and nuts, small grains, seed, long-staple cotton, and sugar beets.

Reclamation projects in 12 States produced 1,450,321 tons of sugar beets, equivalent to a year's supply of sugar for an army of 5,000,000 soldiers.

The 1941 area of 101,219 acres in sugar beets was increased during the planting season of 1942, but labor difficulties and scarcity of factory facilities may restrict the year's production to a 25 percent increase. If labor is available and processing plants are established, production in 1943 could double the 1941 output.

The irrigable acreage for which the Bureau was prepared to supply water in 1942 was 4,915,716 acres. This figure includes more than 500,000 acres under the All-American canal.

The public land opened for homesteading was limited to 2,477 acres of the Payette division of the Boise project in Idaho. Owing to war conditions and the location of Japanese relocation centers on projects in California and Wyoming, other openings were deferred. Additional land was brought under irrigation on the Roza division of the Yakima project in Washington and on the Buffalo Rapids project in Montana.

TABLE 2.—Cumulative crop production, Reclamation projects, 1906-41

	Reclamation projects ¹				Warren Act lands			Entire area				
	Irrigated acreage	Net area in cultivation	Total crop value		Irrigated acreage	Net area in cultivation	Total crop value		Irrigated acreage	Net area in cultivation	Total crop value	
			For year	Cumulative total			For year	Cumulative total			For year	Cumulative total
1906	22,300	1,20,100	\$244,900	\$5,005,360					22,300	1,20,100	\$244,900	\$5,005,360
1907	187,628	1,69,000	4,760,460	12,641,248					187,628	1,69,000	4,760,460	12,641,248
1908	280,519	2,260,500	7,635,888	24,561,911					280,519	2,260,500	7,635,888	24,561,911
1909	410,628	3,369,500	11,926,683	37,506,550					410,628	3,369,500	11,926,683	37,506,550
1910	471,423	4,113,000	12,944,639	50,392,991					471,423	4,113,000	12,944,639	50,392,991
1911	562,311	4,710,100	13,086,441	66,000,125					562,311	4,710,100	13,086,441	66,000,125
1912	614,477	5,400,000	16,007,134	82,276,534					614,477	5,400,000	16,007,134	82,276,534
1913	694,142	6,037,227	15,676,409	98,752,051					694,142	6,037,227	15,676,409	98,752,051
1914	761,271	7,033,424	16,475,517	116,916,503					761,271	7,033,424	16,475,517	116,916,503
1915	810,649	7,900,035	18,164,452	149,732,475					810,649	7,900,035	18,164,452	149,732,475
1916	922,821	8,858,251	32,815,972	169,194,788					922,821	8,858,251	32,815,972	169,194,788
1917	1,026,663	9,966,784	56,402,313	206,194,788					1,026,663	9,966,784	56,402,313	206,194,788
1918	1,151,193	11,051,193	68,971,396	273,016,188					1,151,193	11,051,193	68,971,396	273,016,188
1919	1,187,255	12,113,469	88,974,137	361,990,321					1,187,255	12,113,469	88,974,137	361,990,321
1920	1,223,480	13,153,820	98,974,137	450,981,971					1,223,480	13,153,820	98,974,137	450,981,971
1921	1,227,500	14,157,900	49,320,800	477,782,271					1,227,500	14,157,900	49,320,800	477,782,271
1922	1,202,130	15,169,100	50,360,850	528,143,121					1,202,130	15,169,100	50,360,850	528,143,121
1923	1,213,700	16,179,870	65,016,300	583,189,421					1,213,700	16,179,870	65,016,300	583,189,421
1924	1,240,800	17,216,610	66,488,500	659,296,861					1,240,800	17,216,610	66,488,500	659,296,861
1925	1,320,300	18,212,750	77,608,880	737,296,861					1,320,300	18,212,750	77,608,880	737,296,861
1926	1,411,020	19,328,810	80,398,620	797,656,481					1,411,020	19,328,810	80,398,620	797,656,481
1927	1,378,980	20,326,560	80,298,800	848,880,731					1,378,980	20,326,560	80,298,800	848,880,731
1928	1,442,000	21,355,580	80,298,800	868,641,931					1,442,000	21,355,580	80,298,800	868,641,931
1929	1,483,000	22,420,070	87,559,670	919,440,401					1,483,000	22,420,070	87,559,670	919,440,401
1930	1,504,810	23,467,007	64,418,940	1,036,440,341					1,504,810	23,467,007	64,418,940	1,036,440,341
1931	1,522,718	24,462,565	40,121,689	1,172,146,182					1,522,718	24,462,565	40,121,689	1,172,146,182
1932	1,555,144	25,506,320	31,165,572	1,272,146,182					1,555,144	25,506,320	31,165,572	1,272,146,182
1933	1,580,770	26,549,903	48,138,527	1,220,284,758					1,580,770	26,549,903	48,138,527	1,220,284,758
1934	1,640,936	27,604,168	63,011,663	1,313,514,748					1,640,936	27,604,168	63,011,663	1,313,514,748
1935	1,702,192	28,630,174	78,902,818	1,422,417,566					1,702,192	28,630,174	78,902,818	1,422,417,566
1936	1,725,463	29,700,369	63,000,649	1,495,311,215					1,725,463	29,700,369	63,000,649	1,495,311,215
1937	1,775,584	30,764,363	67,850,804	1,563,171,019					1,775,584	30,764,363	67,850,804	1,563,171,019
1938	1,822,808	31,903,569	73,700,654	1,636,940,673					1,822,808	31,903,569	73,700,654	1,636,940,673
1939	2,152,808	33,988,196	80,098,196	1,717,038,869					2,152,808	33,988,196	80,098,196	1,717,038,869
1940	2,199,179	35,178,228	110,399,807	1,827,438,675					2,199,179	35,178,228	110,399,807	1,827,438,675
1941 ²												

¹ Includes projects constructed by the Bureau of Reclamation and those for which supplemental water is furnished from storage works built by the Bureau.

² Estimated.

³ Does not include All-American Canal (Imperial Valley) project acreage and returns.

⁴ Increase over 1939 largely due to the inclusion of data for projects not included in 1939.

Food and Forage for War

The West depends on irrigated land for more than 70 percent of its food supplies. Surveys indicate that more than 50 percent of the areas served by non-Federal irrigation systems requires supplemental water to insure production in normal times. An assured water supply is doubly essential now to safeguard both the growing civilian and military population of the area from disastrous food shortages in the event of drought—for new land to be brought under irrigation as well as for established irrigated areas.

At the request of members of the Congress, the Bureau outlined for congressional appropriations committees a program for accelerated development of projects under construction. It was shown that by 1945, with high priorities and adequate appropriations, the Bureau could serve 1,964,225 additional acres of land. Included in this area are 1,096,260 acres now inadequately irrigated by other systems, on which food production is limited by water shortages. Included also are about 867,965 acres of new land which can be brought in cultivation.

This accelerated program covers about a fourth of the 8,000,000 acres to be added to the present irrigable acreage in the Bureau's current over-all program of projects in operation, under construction or authorized. When all projects in the over-all program are completed, the Bureau will be prepared to serve 5,115,224 acres with a full (or primary) supply and 7,116,074 acres with supplemental water. This total of 12,231,298 is nearly three times the 4,915,716 acres (table 1 and footnote) the Bureau was prepared to serve with irrigation water in 1941.

In northern project areas are vast acreages that could be devoted to the production of sugar beets. In southern project areas nearly 1,000,000 acres of public land could be devoted to the production of guayule to insure a domestic supply of natural rubber.

Guayule as a domestic source of rubber has been recognized by the Congress. The Bureau, cooperating with the Guayule Emergency Rubber Project of the Forest Service, Department of Agriculture, has made test plots available on the Gila and All-American Canal projects. Growths on these plots are encouraging, and additional land will be provided for more extensive tests during the winter of 1942-43.

If guayule proves suited to southwest areas, under irrigation, it is estimated that approximately 1,000,000 acres can be planted ultimately on the Gila project in Arizona and under the All-American and Coachella branch canals in California. Under the Central Valley project studies begun this year the opportunities for growing guayule in the Central Valley of California are being explored. It is estimated that 300,000 acres may be suited for guayule production.

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An experiment in cryptostegia rubber production is being carried on by the United States Rubber Co. on land leased from the Bureau on the Yuma project in Arizona. This work is still in an investigation stage.

At the close of the fiscal year Reclamation projects provided power and water to 4½ million persons in 15 Western States. On irrigation projects served by Reclamation systems were 1,088,504 persons, on 86,181 farms and in the 291 tributary cities and towns (table 3). The other 3½ million persons received power and domestic water.

In 40 years these projects have created taxable property values of a billion dollars and produced nearly 3 billion dollars (table 2) in crop values—nearly 4 times Reclamation construction expenditures through June 30, 1942 (table 5).

Vital Structures Guarded Against Sabotage

Guards, floodlights, steel fences, and other protective measures against sabotage were placed about vital Reclamation structures such as large dams and power plants during the year.

Begun with foresight early in the fiscal year, the program of protection on 48 projects in operation or under construction was expanded materially upon news of the Japanese attack on Pearl Harbor. On June 30 nearly 650 armed guards were patrolling their assigned beats.

On several projects troops aided in protection. The War Department has ruled that responsibility for protecting vital Reclamation structures rests upon the Bureau, however. Increase of the guard force to 800 was therefore proposed to the Bureau of the Budget for the fiscal year 1943.

Protective steps taken by the Bureau in addition to the guards were floating booms and steel nets in reservoirs to fend off boats and floating objects, prohibition of automobile parking on or near dams, and a close supervision of visitors, who are restricted to certain areas.

Three Japanese Relocation Centers Established

When the Army ordered the evacuation of persons of Japanese ancestry from critical areas on the Pacific coast, three Reclamation projects with undeveloped public land were selected by the War Relocation Authority as sites for relocation centers: The Tule Lake division of the Klamath project in California; the Gooding division of the Minidoka project in Idaho; and the Heart Mountain division of the Shoshone project in Wyoming.

Housing for 16,000 evacuees had been about completed on the Klamath project. Plans were formed to subjugate and bring into production a possible maximum of 21,000 acres. Housing construc-

TABLE 3.—Settlement and economic data, reclamation projects, July 1, 1941

State	Project	Irrigated farms		Towns on or tributary to the project		Number of schools	Number of churches	Banks			Special Warren Act contractors	
		Number	Population	Number	Population			Number	Deposits	Number of depositors	Irrigated farms ^a	Population
Arizona	<i>Regular</i>											
	Salt River	13,158	42,000	12	140,351	96	156	7	78,196,154	34,000	1,110	5,142
	Yuma	1,830	3,525	6	11,029	13	27	1	2,072,841	2,283		
	Grand Valley	697	1,955	1	1,366	5	10	1	1,126,246	2,539		
	Grand Valley	697	1,955	6	19,899	17	40	3	5,062,199	8,061	643	1,929
	Uncompahgre	1,735	5,914	3	8,812	28	35	4	4,200,329	6,626		
	Boise	4,106	16,100	16	51,350	118	130	4	(1)	(1)		
	Minidoka ¹	4,538	16,748	19	24,997	57	104	10	(1)	(1)	3,334	12,068
	Bitter Root	42	1,387	4	6,200	18	13	4	2,347,246	5,432	9,015	82,220
	Frenchtown	650	1,928	1	100	1	1		(1)	(1)		
Montana	Huntley	631	2,532	6	768	7	6	1	190,275	305		
	Milk River	1,064	2,876	5	1,019	11	15	1	5,465,611	7,197		
	Sun River	676	2,404	7	4,280	18	22	3	1,300,701	6,894		
	Lower Yellowstone	3,163	9,188	16	27,362	73	67	9	1,832,430	4,114		
	North Platte	735	2,605	16	27,362	73	67	9	8,893,653	14,170	1,405	6,040
	Newlands	465	2,027	4	17,995	14	20	2	1,000,000	1,800		
	Carlsbad	6,301	30,913	40	131,480	89	184	6	2,550,541	5,183		
	Rio Grande	511	1,474	4	1,528	7	12	1	50,574,788	8,004	108	715
	Umatilla	549	1,685	4	1,312	5	14	1	486,765	1,250		
	Vale	938	2,407	5	28,084	30	35	5	678,600	(1)	500	1,250
Oregon-California	Owyhee	1,480	5,403	8	14,990	28	27	5	(1)	(1)	220	924
	Belle Fourche	697	2,176	5	3,750	22	15	3	3,037,000	4,240		
	Strawberry Valley	2,000	8,550	13	16,264	28	31	4	3,447,878	8,918		
	Okanogan	424	936	4	5,112	9	8	2	1,478,646	2,600		
	Yakima	5,465	17,332	24	46,210	83	80	8	7,911,169	13,814	4,642	22,525
	Kendrick	490	0	7	19,464	17	19	2	10,361,578	12,000		
	Riverton	1,037	2,357	3	2,758	4	16	1	775,000	1,400		
	Shoshone			5	2,219	3	12	1	894,558	1,200		
Subtotal		54,256	188,009	246	601,429	851	1,150	97	193,024,006	147,630	20,997	82,813

TABLE 3.—Settlement and economic data, reclamation projects, July 1, 1941—Continued

State	Project	Irrigated farms		Towns on or trib- utary to the project		Number of schools	Number of churches	Banks			Special Warren Act contractors	
		Number	Popula- tion	Number	Popula- tion			Number	Deposits	Number of depositors	Irrigated farms ¹	Popula- tion
	<i>Supplemental Storage Projects</i>											
California.....	All-American Canal ⁴	4,645	26,000	8	33,723	157	76	7	(¹)	(¹)		
Nevada.....	Humboldt.....	80	1,000	1	1,375	2	4	1	1,316,677	1,350		
	Truckee-Storage.....	425	1,800	2	26,635	25	19	4	21,268,728	19,674		
Oregon.....	Deschutes ²	940	3,700	5	14,405	16	18	4	(¹)	(¹)		
	Stanfield.....	164	405	1	1,200	1	2	0	0	0		
Utah.....	Hyrum.....	516	1,520	3	3,730	5	5	0	0	0		
	Moon Lake.....	722	2,800	5	3,311	15	23	1	484,367	1,738		
	Ogden River.....	1,079	4,300	7	65,533	33	60	4	30,772,568	41,371		
	Sanpete.....	257	1,083	2	2,933	7	6	1	504,000	850		
	Weber River.....	2,100	10,000	11	10,737	26	20	7	21,450,000	25,000		
Subtotal.....		10,928	52,671	45	163,582	287	233	29	75,796,338	89,983		
Grand total.....		65,184	240,680	291	765,011	1,138	1,383	126	268,820,344	237,613		

¹ Data not available.² Includes data for Fremont-Madison Irrigation District.³ Bank data for East division only.⁴ Imperial Valley Section, partially irrigated through All-American Canal.⁵ Central Oregon Irrigation District (Crane Prairie Storage).⁶ Total farms furnished partial or whole water supply by Bureau-constructed works.

tion for 10,000 evacuees on each of the other two centers was well under way. The Minidoka project was to provide 17,000 acres of land for irrigation and the Shoshone project 27,800 acres. Products from these lands are expected to provide subsistence for the evacuees.

The Army Engineers construct the housing and community facilities at the centers. The Bureau of Reclamation supervises the construction, by the evacuees, of the additional irrigation facilities on the projects. Funds for the construction will be provided by the War Relocation Authority, which will operate the centers. The evacuees acquire no rights in the land, a portion of which is expected to be opened for homestead settlement under the Reclamation law at the close of the war.

Consideration was being given to the employment of Japanese evacuees on construction work of Reclamation projects in place of Civilian Conservation Corps enrollees and Work Projects Administration workers.

Columbia Basin Investigations Field Work Virtually Completed

Field work in connection with the 28 joint investigation problems of settler location on the Columbia Basin project in Washington is virtually complete. Results of the field studies are being collated and integrated for application to the actual settlement phase of the project development. Funds have been appropriated by Congress for starting construction of the irrigation system. But construction cannot start until pending legislation authorizing the work is enacted, or repayment contracts are executed by the irrigation districts of the project. The Bureau will be prepared to launch the settlement phase of this project, to extend ultimately to 1,200,000 acres, as soon as water becomes available for irrigation.

Predevelopment Studies Started on Gila Project

Steps were taken to initiate a program of predevelopment on lands of the Yuma Mesa division of the Gila project, Arizona, in conformity with a directive from the Senate Committee on Appropriations. A committee was appointed to study the economic and agricultural aspects of the practical problems confronting settlers on the type of arid desert soil which characterizes mesa lands of this section of Arizona. Through the active cooperation of the college of agriculture, University of Arizona, experience gained by that institution on its experimental plot on the Yuma Mesa has been used in guiding the program. An area of 5,500 acres is expected to be leveled, put under ditch, and planted to alfalfa.

TABLE 3.—Settlement and economic data, reclamation projects, July 1, 1941—Continued

State	Project	Irrigated farms		Towns on or trib- utary to the project		Number of schools	Number of churches	Banks			Special Warren Act contractors		
		Number	Popula- tion	Number	Popula- tion			Number of depositors	Deposits	Number of depositors	Popula- tion		
Supplemental Storage Projects													
California.....	All-American Canal *	4,645	26,000	8	33,723	157	76						
Nevada.....	Humboldt.....	80	1,000	1	1,375	2	4						
Oregon.....	Truckee-Storage.....	425	1,800	2	26,635	25	19		(1)	(1)			
Utah.....	Deschutes †	940	3,700	5	14,405	16	18		1,316,677	1,350			
	Stanfield.....	164	465	1	1,200	1	2		21,268,726	19,674			
	Hyrum.....	516	1,520	3	3,730	6	5		(1)	(1)			
	Noon Lake.....	722	2,800	5	3,311	15	23		0	0			
	Ogden River.....	1,079	4,300	7	65,533	33	60		484,367	1,738			
	Sanpete.....	257	1,086	2	2,933	7	6		30,772,568	41,371			
	Weber River.....	2,100	10,000	11	10,737	26	20		604,000	850			
Subtotal.....		10,928	52,671	45	163,582	287	233		21,450,000	25,000			
Grand total.....		65,184	240,680	291	765,011	1,138	1,383		75,796,338	89,983			
									268,820,344	237,613			

* Data not available.
† Includes data for Fremont-Madison Irrigation District.
‡ Bank data for East division only.

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¶ Imperial Valley Section, partially irrigated through All-American Canal.

• Central Oregon Irrigation District (Crane Prairie Storage).

* Total farms furnished partial or whole water supply by Bureau-constructed works.

tion for 10,000 evacuees on each of the other two centers was well under way. The Minidoka project was to provide 17,000 acres of land for irrigation and the Shoshone project 27,800 acres. Products from these lands are expected to provide subsistence for the evacuees.

The Army Engineers construct the housing and community facilities at the centers. The Bureau of Reclamation supervises the construction, by the evacuees, of the additional irrigation facilities on the projects. Funds for the construction will be provided by the War Relocation Authority, which will operate the centers. The evacuees acquire no rights in the land, a portion of which is expected to be opened for homestead settlement under the Reclamation law at the close of the war.

Consideration was being given to the employment of Japanese evacuees on construction work of Reclamation projects in place of Civilian Conservation Corps enrollees and Work Projects Administration workers.

Columbia Basin Investigations Field Work Virtually Completed

Field work in connection with the 28 joint investigation problems of settler location on the Columbia Basin project in Washington is virtually complete. Results of the field studies are being collated and integrated for application to the actual settlement phase of the project development. Funds have been appropriated by Congress for starting construction of the irrigation system. But construction cannot start until pending legislation authorizing the work is enacted, or repayment contracts are executed by the irrigation districts of the project. The Bureau will be prepared to launch the settlement phase of this project, to extend ultimately to 1,200,000 acres, as soon as water becomes available for irrigation.

Predevelopment Studies Started on Gila Project

Steps were taken to initiate a program of predevelopment on lands of the Yuma Mesa division of the Gila project, Arizona, in conformity with a directive from the Senate Committee on Appropriations. A committee was appointed to study the economic and agricultural aspects of the practical problems confronting settlers on the type of arid desert soil which characterizes mesa lands of this section of Arizona. Through the active cooperation of the college of agriculture, University of Arizona, experience gained by that institution on its experimental plot on the Yuma Mesa has been used in guiding the program. An area of 5,500 acres is expected to be leveled, put under ditch, and planted to alfalfa.

The program has the double purpose of conditioning the land for settler operation and of preparing an area for commercial plantings of guayule or other rubber-bearing plants, should they be required for war.

The experience gained in predevelopment of Yuma Mesa lands will be unique in its field. No other similar large area has been irrigated in the West. In order to assist future settlers in solving complex problems as to varieties of crops best adapted, the application and amount of irrigation water, settlement, and a host of similar subjects, the Bureau of Reclamation is advancing this work as rapidly as its authority will permit.

Central Valley Studies Undertaken

The rapidly converging problems of the agricultural and industrial economy of the Central Valley project area, associated with the construction of Shasta Dam, Friant Dam and other project works, are under intensive study by the Bureau and more than 50 cooperating agencies, Federal, State, and local.

The prime objective of the Central Valley studies is to direct its vast potentialities as rapidly as possible into war work. As these potentialities develop into realities of power for war industry, stabilized water supplies to lands now irrigated, more water for industrial plants, and new agricultural lands, the Bureau is working out the details of project administration.

As a second objective, the Central Valley studies will establish guideposts for the utilization of power, water, and land in a long-range program.

Construction Results

Five Dams Completed

The Bureau of Reclamation brought to completion 5 of the 15 storage dams under construction on irrigation projects. Three of the completed dams—Grand Coulee, Friant, and Marshall Ford—are the first, fourth, and fifth largest concrete dams in the world.

New electric generating equipment greatly increased the operating capacity of 28 plants on Reclamation projects. Also erected were 274 miles of high-voltage transmission lines.

The storage capacity of Reclamation reservoirs at the end of the fiscal year was 61,610,283 acre-feet, an increase of 13,845,680 acre-feet—29 percent—over the July 1, 1941, capacity. Active storage content, available for power, irrigation, domestic and industrial use, was 47½ million acre-feet compared with 41½ million last year.

Statistically, the year showed the following additional construction: 260 miles of canals, 79 miles of drains, and 2,888 canal structures; 556 culverts, 48 flumes, 183 bridges; 259 miles of roads; 169 miles of telephone lines; 89 miles of pipe line; 13 tunnels of a total length of 38,655 feet; and 2 miles of railroad line. Placed in dams and other structures were 3,668,333 cubic yards of concrete, 2,247,653 cubic yards of earth, and 736,591 cubic yards of rock. Excavated in operations: 22,269,750 cubic yards of earth and rock. Used for concrete in structures: 4,156,572 barrels of cement.

The following dams were completed during the year: Grand Coulee Dam (Columbia Basin project, Washington), 9,926,005 cubic yards in volume, a straight-gravity concrete structure creating a reservoir with an estimated storage capacity of 9,700,000 acre-feet; Friant Dam (crest height was reached but the spillway gates and outlet works were not yet installed), (Central Valley project, California), 2,045,860 cubic yards in volume, a straight-gravity concrete structure creating a reservoir of 520,550 acre-feet capacity; Vallecito Dam (Pine River project, Colorado), an earth and rock-fill structure with a reservoir capacity of 129,675 acre-feet; Marshall Ford (Mansfield) Dam (Colorado River project, Texas), 1,864,000 cubic yards in volume, a straight-gravity concrete structure (with earth and rock-fill embankments of 1,715,000 cubic yards) with a reservoir capacity of 3,120,000 acre-feet; and Deer Creek Dam (Provo River project, Utah), an earth and rock-fill structure with a reservoir capacity of 150,000 acre-feet.

Two More Power Plants

Two of the newly completed dams—Grand Coulee and Marshall Ford—have power plants. When fully installed Grand Coulee's plant will have by far the largest installation in the world. Marshall Ford was in full operation at the end of the year.

Construction work was being pushed on more new plants at Parker, Green Mountain, Shasta, Keswick, and Anderson Ranch Dams.

The capacity of Boulder Dam; bulwark of war power in the Pacific Southwest, was being increased at a tremendous rate. As the fiscal year closed a large generator was being tested for operation and another was being rushed to completion for operation in December 1942. In addition, a third was ordered with high priority to supply a huge magnesium plant near the dam.

Water Conservation Program Progresses

Construction proceeded on 6 projects of the water conservation and utilization program to stabilize agriculture and employment in

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the Great Plains and other semiarid areas to the westward most seriously affected by periodic droughts. The irrigated and producing area of a seventh project, under construction but already in operation, was increased. The 7 projects when completed will irrigate a total of 85,320 acres of land and benefit nearly a million acres of range.

Progress was retarded, however, by the imminent disbandment of the Civilian Conservation Corps, a large reduction in Work Projects Administration forces (both agencies contribute nonreimbursable labor to construction of water conservation and utilization projects) and restrictions on critical materials.

The need for this type of small project as a safeguard against drought and unemployment is unabated despite more rainfall in the Great Plains.

The Bureau carried on investigations of potential development of this type for inclusion in its shelf of projects to provide employment and maintain established communities at the close of the war.

Forty Years of Construction

In the 40 years of its existence as a Federal agency the Bureau of Reclamation has placed in operation 45 irrigation projects. In the construction of these wealth-producing projects the Bureau has built 166 dams; 28 power plants; 5,678 miles of high-voltage transmission lines; 372 pumping plants; 16,277 miles of main canals and laterals; 5,010 miles of ditches and drains; and 208,931 canal structures. It has built 14,255 bridges, 23,060 culverts and 6,475 flumes, and bored 380 tunnels of a combined length of 105 miles. It has laid 2,264 miles of pipe and built 3,994 miles of road.

The Bureau has excavated 603,115,119 cubic yards of earth and rock and has used 35,195,538 barrels of cement in building irrigation structures containing 30,834,046 cubic yards of concrete—enough to pave a standard two-lane highway around the world at the equator.

Denver Laboratory a Crucible of Construction

The crucible of Reclamation engineering work is the expert-manned laboratory of the Bureau at Denver, Colo. Designs and materials for structures are submitted to intensive study and actual test by qualified engineers, some of international reputation. The applied science not only has insured sound, lasting, low-cost structural work but has saved the Government millions of dollars. Nearly \$6,000,000 was saved in the cost of Grand Coulee Dam alone by laboratory analysis of available cements and refinements in structural design as a result of exhaustive laboratory research.

Grand Coulee Dam Finished

The final bucket of the 9,926,005 cubic yards of mass concrete was placed in Grand Coulee Dam on the Columbia River in Washington. The pumping plant foundation and the left powerhouse were completed in December and work commenced on the right powerhouse.

Cooling of the mass concrete, in progress 5 years and requiring 2,000 miles of 1-inch pipe for circulating chilled river water, was completed in January.

The first big Grand Coulee generator went on the line October 1, the second on January 29, and the third on April 7. Two station-service generators started operating on March 22, 1941, because of the urgent need for power for Northwest defense industry. Contracts were also awarded during the fiscal year for additional big machines. In April, preparations began at Coulee for the installation of some generators originally purchased for the Shasta power plant on the Central Valley project. This shift was an incisive war measure recommended by the War Production Board. It makes additional power available to war industry practically a whole year sooner. The generators were to start operating before the end of 1942.

Completed during the year was the work of mapping and classifying 2,000,000 acres below the dam, and the appraisal of 1,200,000 selected fertile acres which ultimately will be irrigated, creating homes and livelihood for a third of a million persons.

The reservoir reached spill height on June 1. A tremendous cataract—larger in volume than Niagara Falls and twice as high—poured over the spillway down the face of the dam. The event was hailed as a wartime baptism of Grand Coulee's important role in supplying power to the Pacific Northwest.

Migratory fish conservation work was continued successfully to save salmon and fighting steelhead trout of the Columbia which were blocked by Grand Coulee's massive wall of concrete. Two hatcheries were in operation—at Leavenworth and at Entiat—under the direction of the Fish and Wildlife Service.

Central Valley Construction Advanced

Completing the relocation of the Southern Pacific Railroad around the Shasta Reservoir, placing the final cubic yard of concrete in Friant Dam, and commencing work on Keswick Dam and power plant were outstanding events on the Central Valley project, California.

Shasta Dam, a concrete gravity structure, 602 feet high (second in height only to Boulder) with a crest length of 3,500 feet, was 66 per cent completed. More than half the estimated 6,230,000 cubic yards

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had been placed. Concrete work on Shasta power plant was nearing completion.

Relocation of 36 miles of the main line of the Southern Pacific Railroad from the Shasta Reservoir site to a shorter new line outside the reservoir was completed in March. The new line is 30 miles long and includes 12 tunnels with a total length of $3\frac{1}{2}$ miles and 8 major bridges, including the highest double-decked bridge in the world, over the Pit River.

Migratory fish conservation, necessary for the protection of the salmon industry, was begun. Fish will be caught in traps at Keswick Dam and Balls Ferry, and transported by tank trucks to the Coleman station on Battle Creek, which is under construction.

Work was started on Keswick Dam and power plant, 9 miles downstream from Shasta. The structure will be operated to reregulate the variable releases from the Shasta power plant and generate power.

Friant Dam on the San Joaquin River reached crest height in June with the placing of 2,045,860 cubic yards of concrete. The spillway gates and outlet valves were not installed, however, owing to lack of priorities. The straight-gravity structure is 320 feet high with a crest length of 3,430 feet.

Work was continued during the year on the first section of the 37-mile Madera Canal, one of two main canals leading from Millerton Lake, the 520,550 acre-foot reservoir formed by Friant Dam.

Through a section of Contra Costa canal in the Sacramento-San Joaquin delta area domestic and industrial water was being supplied to the city of Pittsburg.

Boulder Dam Supplies War Power

Boulder Dam on the Boulder Canyon project of Arizona-Nevada-California supplied increased war power for Pacific Southwest industry. On October 9 another generator went on the line. The October installation made the Boulder plant the largest in the world.

Colorado-Big Thompson Tunnel Driven 5 Miles

At the rate of more than 40 feet a day workmen drilled through the granite backbone of the Rocky Mountains, holing out the 13-mile Continental Divide Tunnel on the Colorado-Big Thompson project, Colorado. The tunnel will shunt Colorado River headwaters from the western to the eastern slope of the mountain. It was more than 8 miles complete on June 30; nearly 5 miles were excavated during the preceding 12 months. En route to sugar beet fields and other crops the irrigation water, after passing through the tunnel, will energize 6 power plants.

On the west slope work on Green Mountain storage dam and power plant proceeded with rapidity. The power plant is due to begin operating in February 1943.

In December 1941 the diversion and outlet tunnel was started for Granby Dam and by June 30 was 62 percent complete.

Deer Creek Dam Finished on Provo River Project

Deer Creek Dam on the Provo River about 14 miles northeast of Provo, Utah, was completed in October 1941. This storage dam is the second largest earth and rock-fill dam to be built by the Bureau. It is 235 feet high, 1,256 feet long, 2,809,800 cubic yards in volume, with a storage reservoir capacity of 150,000 acre-feet.

Also completed was a 9-mile section of the 40-mile Salt Lake Aqueduct on which work is being pushed with all possible speed. The aqueduct will provide domestic and industrial water for Salt Lake City. A contract was awarded to enlarge the Weber-Provo Canal.

All-American Canal Supplies Entire Imperial Valley

Operation of the All-American Canal—the country's largest irrigation canal, 242 feet in maximum width at water surface, 80 miles long extending from the Colorado River to the west end of the Imperial Valley, deep enough to float an ocean-going vessel—was extended throughout the Imperial Valley during the fiscal year.

On the 131-mile Coachella branch which stems from the All-American Canal, 81 miles are excavated; also structures along 47 miles are complete.

Rapid Progress on Anderson Ranch Dam

Excellent progress, with work 23 percent complete on June 30, was made during the fiscal year on Anderson Ranch dam and power plant, contract for which was awarded August 1941.

Located about 20 miles northeast of Mountain Home, Idaho, on the South Fork of Boise River, the structure will be the highest earth and rock-fill dam in the world—444 feet from the lowest point in the foundation cut-off to crest. A multiple-purpose development, the structure is also the largest dam of its type undertaken by the Bureau to date—9,600,000 cubic yards as designed.

The 500,000 acre-foot reservoir to be formed by the dam will provide a needed supplemental water supply for more than 300,000 acres of farm lands in the Boise Valley and control floods. The power plant will offset deficiencies in southern Idaho and northern Utah.

Marshall Ford Dam Finished

Marshall Ford (Mansfield) Dam on the Colorado River, about 18 miles northwest of Austin, Tex., was completed in May. It is a concrete structure of the straight-gravity type, 270 feet high, with an earth and rock-fill wing embankment at the left abutment 105 feet high and 4,910 feet long. With an over-all length of 7,333 feet, the dam contains 3,579,000 cubic yards of concrete, earth, and rock. The reservoir of 3,120,000 acre-foot capacity will provide flood control in addition to water for power generation.

Parker Power Plant Almost Ready for Operation

The powerhouse and installation of electrical machinery at Parker Dam, Arizona-California, neared completion. Construction of the Phoenix terminal substation was also in progress. On November 3 a contract was awarded for building a 123½-mile transmission line from Phoenix to Tucson, and a 50-mile line to connect the Gila substation at Blaisdell, Ariz., with drop No. 4 on the All-American canal in California.

Water Made Available for New Yakima Land

Approximately 50 miles of the 99-mile Yakima Ridge canal on the Roza division of the Yakima project in Washington were completed on June 30. Water for the irrigation of 6,630 acres was made available for the 1942 season.

On the Tucumcari project in New Mexico, earthwork and structures on a 25-mile section of the 75-mile Conchas main canal were completed, also three tunnels with a combined length of 3.8 miles.

On the Gila project in southwestern Arizona pumping plant No. 1 was completed in November. Installation of three pumps was started in December. Earthwork, structures and concrete lining for canals and laterals on unit No. 1 of the Yuma Mesa division were about half complete.

Canal and lateral construction was in progress on the Heart Mountain division of the Shoshone project, and the Riverton and Kendrick projects, all in Wyoming; the Owyhee project in Oregon-Idaho; and the Deschutes project in Oregon. Work was continued on the Wickiup Dam and canal system on the Deschutes project, using Government and CCC forces. The Cody-Thermopolis transmission line on the Shoshone project was completed in November. The Modoc unit of the Tule Lake division of the Klamath project, Oregon-California, was under construction.

Davis Dam Contract Awarded

A contract was awarded in June for construction of Davis Dam and power plant on the Colorado River about 67 miles downstream from Boulder. The dam will be an earth and rock-fill structure 200 feet high with a volume of 4,230,000 cubic yards, forming a reservoir of 1,940,000 acre-foot capacity.

Palisades Dam Authorized

Palisades Dam project on the Snake River in Idaho was authorized for supplemental storage and power generation under the 1939 Reclamation Project Act. Changed plans necessitated reauthorization of the Rapid Valley project on Castle Creek in South Dakota. Both projects include earth dams.

Field Investigations in Full Swing

Engineering investigations have two major objectives in connection with the war program: First, to determine the best method of providing additional electric power to avert a shortage in vital production areas of the West. Second, to prepare a reservoir of feasible irrigation and multiple-purpose projects on which construction can be quickly launched to provide employment and settlement opportunities at the close of the war.

Studies have been made of numerous hydroelectric power sites and steam plant installations. The major purpose of the steam developments would be to firm the power from and balance the output of existing or proposed hydroelectric plants.

The following 27 power projects have been investigated:

Albuquerque (steam) near Albuquerque, N. Mex.	Heart Mountain near Cody, Wyo.
Bismarck (steam) near Bismarck, N. Dak.	Klickitat near White Swan, Wash.
Brazos River near Waco, Tex.	Kortes power near Casper, Wyo.
Bridge Canyon near Kingman, Ariz.	Lower Big Horn near Hardin, Mont.
Cabinet Gorge near Sandpoint, Idaho.	Mystic power near Reno, Nev.
Canyon Ferry near Helena, Mont.	Newark (steam) near Newark, Calif.
Debenger Gap near Medford, Oreg.	Palisades Dam near Alpine, Idaho.
Denison power near Denison, Tex.	Pelton power near Redmond, Oreg.
Detroit power near Detroit, Oreg.	Pilot Knob near Yuma, Ariz.
Dewey Reservoir near Moab, Utah.	Provo (steam) near Provo, Utah.
El Paso (steam) near El Paso, Tex.	Sacramento (steam) near Sacramento, Calif.
Five Mile Rapids near The Dalles, Oreg.	Scraper Creek near Garden Valley, Idaho.
Folsom power near Folsom, Calif.	South Dakota (steam) near Mobridge, S. Dak.
Fort Collins (steam) near Fort Collins, Colo.	

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For a reserve of irrigation and multiple-purpose projects, more than 200 potential areas were under investigation. The work was divided among the States approximately as follows:

State	Project	Basin surveys	State	Project	Basin surveys
Arizona.....	10	2	Oklahoma.....	5	2
California.....	7	4	Oregon.....	20	4
Colorado.....	19	5	South Dakota.....	3	1
Idaho.....	13	4	Texas.....	7	1
Kansas.....	4	3	Utah.....	21	5
Montana.....	6	5	Washington.....	3	2
Nebraska.....	4	1	Wyoming.....	12	6
Nevada.....	1	3			
New Mexico.....	5	2	Total.....	145	64
North Dakota.....	5	4			

Tentative reports were prepared on 11 individual projects and 9 basin-wide reconnaissances as follows:

Project	River	State	River Basin	States
Balmorhea.....	Pecos.....	Texas.....	Missouri River below Fort Peck..	Montana, North Dakota, South Dakota.
Vaughn Division.....	Sun.....	Montana.....		
Robert Lee.....	Colorado.....	Texas.....	Upper Brazos.....	Texas.
Kern River.....	Kern.....	California.....	North Canadian.....	New Mexico, Oklahoma, Texas.
Middle Rio Grande.....	Rio Grande.....	New Mexico.....	Smoky Hill.....	Colorado, Kansas.
Savage pumping.....	Yellowstone.....	Montana.....	South Umpqua.....	Oregon.
Mountain Home.....	Snake.....	Idaho.....	Neuces.....	Texas.
Bully Creek.....	Malheur.....	Oregon.....	Grand.....	North Dakota, South Dakota.
Cambridge.....	Republican.....	Nebraska.....	Knife.....	North Dakota.
Intake pumping.....	Yellowstone.....	Montana.....	Big Horn.....	Montana, Wyoming.
Canyon Ferry.....	Missouri.....	do.....		

The Bureau has been reviewing flood control reports of the War Department in numerous stream basins in California. Eight reviews have been completed and 20 others are in progress. This work has been carried out under the terms of the agreement of August 14, 1939, by which the Bureau of Reclamation, the War Department and the Department of Agriculture interchange information on multiple-purpose projects. The National Resources Planning Board is the liaison agency.

Operation of Projects

Multiple Goal Pursued

Production of food, forage and fiber was the multiple goal of the operation and maintenance activities on the Bureau's irrigation projects. Foresight pointed to the time when these agricultural commodities and especially foodstuffs might have as much effect on the outcome of the war as weapons.

The Division of Operation and Maintenance from headquarters in

Denver urged all projects to respond to the growing need for essential foodstuffs and livestock by bringing all irrigable land into production. On some projects idle tracts were leased and brought into cultivation. Larger areas of withdrawn classified land were leased for expanded stock raising. The acreage planted in the spring of 1942 was an increase over 1941.

The educational program to assist farmers in making the most economical use of available water supplies, preventing soil erosion, eradicating noxious weeds and developing pasture acreages, made good progress. Motion pictures, illustrated lectures, and instructive circulars were used.

Cooperative programs with agencies of the Department of Agriculture were continued. The Farm Security Administration has been active in helping settlers on newly developed areas on several Reclamation projects. Funds were transferred during the fiscal year 1942 for the employment of specialists of the Extension Service to assist farmers on certain Reclamation projects.

The Bureau took measures to aid in the Federal program for directing excess purchasing power of the water users into non-inflationary channels. It urged retirement of outstanding debts, advance payment of Government obligations and the creation of a reserve fund to take care of post-war emergencies. Projects were given information on the Government's policy with suggestions as to methods of cooperation.

Soil and Moisture Conservation Work Continued

Soil and moisture conservation operations were continued on lands under the Bureau's jurisdiction. Work included hydrographic measurements and studies for determination of seepage losses in canals and laterals; studies of materials and demonstrations of their application as sealing agents to reduce seepage; prevention of water erosion and depletion of soil fertility; and construction of controlling structures and planting of vegetation on noncultivated land at locations suffering from extreme wind erosion.

Six Contracts With Water User Organizations Executed

Amendatory contracts under the Reclamation Project Act of 1939 to adjust annual repayments to paying ability were executed with 6 water users' organizations. Contract drafts have been completed for 5 irrigation districts, and preliminary drafts for 9. Preparatory studies were begun on contracts for 11 districts.

Under the act of 1939, reclassification of irrigable acreages has been completed on 6 projects, and was in progress on 2 others.

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Savage pumping.....	Yellowstone.....	Montana.....	South Umpqua.....	Oregon.
Mountain Home.....	SNAKE.....	Idaho.....	Neuces.....	Texas.
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Production of food, forage and fiber was the multiple goal of the operation and maintenance activities on the Bureau's irrigation projects. Foresight pointed to the time when these agricultural commodities and especially foodstuffs might have as much effect on the outcome of the war as weapons.

The Division of Operation and Maintenance from headquarters in

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For a reserve of irrigation and multiple-purpose projects, more than 200 potential areas were under investigation. The work was divided among the States approximately as follows:

State	Project	Basin surveys	State	Project	Basin surveys
Arizona.....	10	2	Oklahoma.....	5	2
California.....	7	4	Oregon.....	20	4
Colorado.....	19	5	South Dakota.....	3	5
Idaho.....	13	4	Texas.....	7	7
Kansas.....	4	3	Utah.....	21	5
Montana.....	6	5	Washington.....	3	2
Nebraska.....	4	1	Wyoming.....	12	6
Nevada.....	1	3			
New Mexico.....	5	2	Total.....	145	64
North Dakota.....	5	4			

Tentative reports were prepared on 11 individual projects and 9 basin-wide reconnaissances as follows:

Project	River	State	River Basin	States
Balmorhea.....	Pecos.....	Texas.....	Missouri River below Fort Peck..	Montana, North Dakota, South Dakota.
Vaughn Division.....	Sun.....	Montana.....	Upper Brazos.....	Texas.
Robert Lee.....	Colorado.....	Texas.....	North Canadian.....	New Mexico, Oklahoma, Texas.
Kern River.....	Kern.....	California.....	Smoky Hill.....	Colorado, Kansas.
Middle Rio Grande.....	Rio Grande.....	New Mexico.....	South Umpqua.....	Oregon.
Savage pumping.....	Yellowstone.....	Montana.....	Neuces.....	Texas.
Mountain Home.....	Snake.....	Idaho.....	Grand.....	North Dakota, South Dakota.
Bully Creek.....	Malheur.....	Oregon.....	Knife.....	North Dakota.
Cambridge.....	Republican.....	Nebraska.....	Big Horn.....	Montana, Wyoming.
Intake pumping.....	Yellowstone.....	Montana.....		
Canyon Ferry.....	Missouri.....	do.....		

The Bureau has been reviewing flood control reports of the War Department in numerous stream basins in California. Eight reviews have been completed and 20 others are in progress. This work has been carried out under the terms of the agreement of August 14, 1939, by which the Bureau of Reclamation, the War Department and the Department of Agriculture interchange information on multiple-purpose projects. The National Resources Planning Board is the liaison agency.

Operation of Projects

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Production of food, forage and fiber was the multiple goal of the operation and maintenance activities on the Bureau's irrigation projects. Foresight pointed to the time when these agricultural commodities and especially foodstuffs might have as much effect on the outcome of the war as weapons.

The Division of Operation and Maintenance from headquarters in

Denver urged all projects to respond to the growing need for essential foodstuffs and livestock by bringing all irrigable land into production. On some projects idle tracts were leased and brought into cultivation. Larger areas of withdrawn classified land were leased for expanded stock raising. The acreage planted in the spring of 1942 was an increase over 1941.

The educational program to assist farmers in making the most economical use of available water supplies, preventing soil erosion, eradicating noxious weeds and developing pasture acreages, made good progress. Motion pictures, illustrated lectures, and instructive circulars were used.

Cooperative programs with agencies of the Department of Agriculture were continued. The Farm Security Administration has been active in helping settlers on newly developed areas on several Reclamation projects. Funds were transferred during the fiscal year 1942 for the employment of specialists of the Extension Service to assist farmers on certain Reclamation projects.

The Bureau took measures to aid in the Federal program for directing excess purchasing power of the water users into non-inflationary channels. It urged retirement of outstanding debts, advance payment of Government obligations and the creation of a reserve fund to take care of post-war emergencies. Projects were given information on the Government's policy with suggestions as to methods of cooperation.

Soil and Moisture Conservation Work Continued

Soil and moisture conservation operations were continued on lands under the Bureau's jurisdiction. Work included hydrographic measurements and studies for determination of seepage losses in canals and laterals; studies of materials and demonstrations of their application as sealing agents to reduce seepage; prevention of water erosion and depletion of soil fertility; and construction of controlling structures and planting of vegetation on noncultivated land at locations suffering from extreme wind erosion.

Six Contracts With Water User Organizations Executed

Amendatory contracts under the Reclamation Project Act of 1939 to adjust annual repayments to paying ability were executed with 6 water users' organizations. Contract drafts have been completed for 5 irrigation districts, and preliminary drafts for 9. Preparatory studies were begun on contracts for 11 districts.

Under the act of 1939, reclassification of irrigable acreages has been completed on 6 projects, and was in progress on 2 others.

Relief to Water Users Reduced

Relief by the extension of time for the payment of construction charges pursuant to Section 17b of the act of 1939, where water users are unable to pay such charges without great hardship, was greatly reduced. Time extensions were granted to 10 districts by the Secretary of the Interior for charges accrued for the calendar year 1941. The extensions amounted to \$322,929 or less than 11 percent of charges due from all projects, a reduction of about 50 percent of the amount granted for 1940. More prosperous conditions and improved water supplies increased the ability of the water users to pay their obligations.

CCC Suspended

Civilian Conservation Corps camp operations on Federal Reclamation projects were suspended late in the year in anticipation of the termination of CCC activities. Originally organized under the Emergency Conservation Work program, the CCC established its first camp on a Reclamation project at Guernsey Reservoir in Wyoming in 1934. On July 1, 1941 there were 43 camps.

During the past 7 years over 15,000 old wooden water control structures in canal systems were ripped out and replaced by permanent concrete structures; canals were straightened, strengthened, and rebuilt to grade and cross-section, and more than 100 miles were concrete-lined; 3,000 miles of operating roads were constructed along canal banks; dams of all types were examined, and rebuilt and repaired wherever necessary; 40,000 acres in reservoir areas were cleared of timber and debris; destructive rodents by tens of thousands were exterminated; and an aggressive campaign of weed control on Government lands was developed.

A major part of the construction on the Deschutes project, Oregon, was assigned to CCC forces. They also undertook reservoir clearing jobs on Utah projects, at Shasta Dam in California, and Vallecito Dam in Colorado. Facilities built by the CCC now provide recreation at Elephant Butte and Alamogordo Reservoirs in New Mexico, Guernsey, and Alcova in Wyoming, Minatare in Nebraska, Lahontan in Nevada, and Lake Walcott in Idaho.

CCC camps were assigned in 1942 to seven water conservation and utilization projects in the Dakotas, Nebraska, Montana, Wyoming, and Colorado, to build dams, canals and related structures.

The work of enrollees at camps on Reclamation projects trained thousands of truck drivers and tractor operators. Elementary training in concrete and masonry construction, erection of frame structures and the use and repair of hand tools were standard on job courses.

Although CCC work on Reclamation projects was far from complete when suspended, the excellent condition of the reservoirs and canal systems brought about by CCC forces is high-quality insurance against interruptions in the growing of crops on irrigated land.

Bureau Organization Being Remolded

The organization of the Bureau of Reclamation in Washington and in the field was being molded to the war pattern. Power plant construction, protection of structures against sabotage and preparation for irrigation expansion to meet war needs required an increase in personnel which more than offset military furloughs and transfers to other war agencies. The number rose from 7,636 to 8,016. The number of field offices remained at 57 but arrangements were being made to close several small ones.

Effective October 1941, the headquarters of the Operation and Maintenance division was transferred from Washington, D. C., to Denver, Colo. The accounting division, except for the chief accountant and a staff of five, also was transferred to Denver—to be designated as the central accounting office.

TABLE 4.—Accretions to Reclamation fund by States

States	Sale of public lands		Proceeds from oil leasing act		Total to June 30, 1942
	Fiscal year 1942	To June 30, 1942	Fiscal year 1942	To June 30, 1942	
Alabama			\$3,313.07	\$197,572.26	\$197,572.26
Arizona	\$21,697.82	\$2,763,735.13	1,370.02	4,852.24	2,768,587.37
California	36,764.10	8,302,696.00	1,112,749.20	20,629,356.23	28,931,452.23
Colorado	9,937.03	10,322,798.29	99,890.74	997,259.52	11,330,057.81
Idaho	10,655.49	7,054,747.18	479.35	22,206.29	7,076,953.47
Kansas	81.71	1,033,601.40	3,720.28	6,815.54	1,040,416.94
Louisiana			12,698.46	321,484.82	321,484.82
Michigan			19.69	47.26	47.26
Mississippi			84.00	110.25	110.25
Montana	4,123.41	15,387,227.78	114,951.74	1,536,584.47	16,923,812.25
Nebraska	456.53	2,097,288.25	26.25	252.00	2,097,540.25
Nevada	3,237.34	1,040,785.90		5,614.22	1,046,000.12
New Mexico	13,773.82	6,742,290.99	870,297.49	3,639,373.98	10,381,634.97
North Dakota	68.76	12,219,646.27	20,421.78	240,407.90	12,460,054.17
Oklahoma	468.39	5,931,145.58	3,389.15	6,089.77	5,937,235.35
Oregon	424.58	11,904,947.97	665.20	852.02	11,905,799.99
South Dakota	1,205.42	7,733,675.48	5,810.28	12,746.26	7,746,421.74
Utah	27,333.49	4,397,505.92	145,309.90	984,428.13	5,381,934.05
Washington	6,674.65	7,472,860.19	5,626.55	42,308.26	7,515,188.45
Wyoming	12,143.86	8,720,428.32	1,489,478.77	39,493,629.58	48,214,057.90
Total	149,047.40	113,214,380.65	3,899,301.92	68,141,991.00	181,356,371.65
Proceeds, Federal water-power licenses					1893,844.45
Proceeds, potassium royalties and rentals					11,145,403.42
Receipts from naval petroleum reserves, 1920 to 1938, act of May 9, 1938					29,778,300.23
Grand total					213,173,921.75

1. Proceeds for fiscal year, \$38,408.83.

2. Proceeds for fiscal year, \$297,639.17.

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The accounting division transfer was not officially effective until July 1, however, and was not reflected in the personnel employed as of June 30, 1942, in Washington, D. C.—152, including the Commissioner and Assistant Commissioner and employees detailed to other offices and agencies but carried on the Washington office salary roll. Of the 7,864 Bureau employees in the field, 1,086 were in the field headquarters at Denver under supervision of the Chief Engineer and the General Supervisor of Operation and Maintenance and 6,778 were engaged in construction or operation and maintenance activities on the projects.

Fifty supervisory engineers report directly to the Chief Engineer in Denver; 22 project superintendents or other supervising officials report directly to the General Supervisor of Operation and Maintenance. Both the Chief Engineer and General Supervisor report to the Commissioner, who is appointed by the President and serves under direction of the Secretary.

During the year 517 Bureau employees were given military furloughs. The Bureau also released several hundred engineers for civilian transfers to the War Department, Navy Department, and other war agencies.

Reclamation Fund Accretions

Accretions to the Reclamation fund created by the Reclamation Act of 1902 (table 4) brought the total cash available from this source in 40 years to \$213,173,921.75. Collections—construction and operation and maintenance repayments, water rentals, power, etc.—were \$141,266,462.78. Disbursements totaled \$339,913,575.29, leaving a balance in the fund on June 30 of \$14,526,809.25.

Construction repayment collections during the year totaled \$2,327,886.42; operation and maintenance collections amounted to \$1,253,099.50; and water rental, power, and other receipts of \$2,983,596.66 were repaid to the Reclamation fund during the fiscal year 1942.

Federal Investment Increased

Construction expenditures for all projects during the year of \$84,349,841.29 increased to \$816,768,590.05 on June 30, 1942, the Federal investment, through the Bureau of Reclamation, in irrigation, power and multiple-purpose facilities in the West (table 5).

The emphasis in the fiscal year 1942 was on facilities which will bring in power for war industries. Expenditures, however, were directed toward completion of facilities which will benefit irrigation directly through additional storage or which, through power revenues, will assist in the repayment of the cost of irrigation systems.

For the fiscal year 1943, appropriations by the Congress for the Bureau of Reclamation totaled \$89,273,270, summarized as follows:

Reclamation fund:

Operation and maintenance.....	\$1, 171, 220
Construction.....	1, 475, 840

Total.....	\$2, 647, 060
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General fund:

Colorado River front and levee system.....	\$47, 895
Colorado River development fund.....	399, 750
Colorado River dam fund:	
Boulder Canyon project.....	4, 999, 750
All-American canal.....	1, 000, 000
Protection of project works.....	700, 000
Construction (13 projects, investigations, etc.).....	78, 979, 340
Fort Peck power.....	499, 475

Total general fund.....	86, 626, 210
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Grand total.....	89, 273, 270
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John S. Moore, Field Supervisor in Charge of Soil and Moisture Conservation, was appointed General Supervisor of Operation and Maintenance effective September 16, 1941, succeeding George O. Sanford, retired. From Denver headquarters Mr. Moore supervises the activities of 15 projects which are operated in their entirety by the Bureau and 7 other projects which are Bureau-operated with respect to their dams, reservoirs and other reserve works. His administration also extends to 25 projects and operations conducted by water users' organizations under contracts with the United States. The Operation and Maintenance division deals with approximately 120 separate water users' organizations which are under contract with the United States.

TABLE 5.—Consolidated statement of construction cost of Reclamation projects ¹

	Construction cost		Operation and Maintenance before public notice (net)		Operation and Maintenance deficits and arrearages and penalties		Construction revenues, contributed funds, and nonreimbursable appropriation		Abandoned works and nonreimbursable cost and authorized charge-offs	Total repayable	
	Fiscal year 1942	To June 30, 1942	Fiscal year 1942	To June 30, 1942	Fiscal year 1942	To June 30, 1942	Fiscal year 1942	To June 30, 1942		Fiscal year 1942	To June 30, 1942
<i>Regular projects</i>											
Total.....	\$70,537,275.23	\$604,270,362.71	\$77,660.44	\$3,294,708.07	\$127,805.37	\$9,433,920.08	\$955,788.83	\$15,771,219.35	\$17,131,650.70	\$99,787,552.21	\$584,096,121.41
<i>Water conservation and utility projects</i>											
Total.....	\$1,845,524.67	\$4,684,622.93	\$21,091.43	\$39,013.70							
<i>Special projects ²</i>											
Colorado River Dam fund: ³											
All-American Canal.....	\$1,069,486.45	\$31,773,647.25									
Boulder Canyon project.....	3,028,473.76	134,898,945.52									
Arizona:											
Parker Dam ⁴	5,990.82	6,803,083.15									
Parker Dam power ⁵	6,278,106.32	10,771,075.17									
Texas:											
Colorado River, Tex. ⁵	1,596,965.08	23,566,853.32									
Total.....	11,967,041.39	207,813,604.41									
Grand total.....	84,349,841.29	816,768,590.05								\$1,866,424.03	\$4,722,971.56

¹ Consolidated statement by individual projects available in mimeographed form at Bureau of Reclamation, Washington, D. C.² Projects constructed under special legislation.³ All costs repayable.⁴ Funds advanced by Metropolitan Water District of Southern California.⁵ Repayable costs not determined.

(Note.—Specific details relating to individual projects and to power production normally contained in this report have been deleted at the request of the Office of War Information and the War Department)

Bonneville Power Administration

PAUL J. RAVEN, Administrator

DURING the fifth year of its existence, the Bonneville Power Administration greatly increased its delivery of electric energy to war industries, public-owned distribution agencies, Government agencies and private utility enterprises. The energy of the two great dams on the Columbia river—Grand Coulee and Bonneville—was utilized almost continuously on a 24-hour a day basis, and served as one of the aggressive war weapons of the United States.

At the outbreak of the war in December 1941 the Administration was already far along in its war production program and through advanced planning prepared to take on even greater war loads.

With the passage of the defense appropriation bill (H. R. 1055) in June 1940 and the lend-lease bill (H. R. 1776) in March 1941, the Administration early recognized that a tremendous increase in the generating capacity of the Nation was necessary to carry out a war production program.

Early in 1941 the Administration recommended acceleration of installations of generating units at both Bonneville and Grand Coulee Dams and the speeding up of construction of necessary facilities to transmit the additional power to load centers.

As a result additional generating units were authorized at Bonneville Dam and at Grand Coulee Dam. In addition Shasta units were transferred from California for installation at Grand Coulee.

There was also appropriated to the Administration the sum of \$48,858,500 for the fiscal year 1942 for the construction of transmission and substation facilities.

The declaration of war and decisions to locate many war loads east of the Cascades made necessary certain major changes in the Administration's 1942-43 program. It nevertheless found the Administration in a position to meet the war strategy with changes only as to

location of additional lines and substation facilities, thus justifying the basic planning of the system.

The impact of the war program in the area served by the Administration was reflected by war contracts totaling \$1,259,449,000, covering the manufacture of aircraft, ships, ordnance, military and naval supplies and the construction of barracks, docks and munition depots, which had been awarded in Oregon and Washington, between June 15, 1940, and December 31, 1941. This figure does not include the purchase of raw materials such as aluminum, copper, zinc, lead and timber produced in the area.

The Columbia River projects, which had been assailed as "white elephants in the wilderness" during their building, had become an integral part of the war might of the United States.

As the year ended the Administration operated a transmission system containing 1,748 miles of transmission lines and 37 substations.

The Administration acted to integrate all of the Northwest's power resources to provide greater security of service for the growing war load. In addition to its interconnections with the public systems of Seattle, Tacoma, Centralia and Grays Harbor, Wash., and Eugene and McMinnville, Oreg., the Administration interconnected its system with those of the Washington Water Power and Pacific Power & Light Companies. An interconnection with the Portland General Electric Co. was continued through the year.

Public-owned agencies, established for the purpose of distributing Columbia River power without profit and entitled to preference in purchasing Columbia River power under the Bonneville Act, voluntarily postponed their plans for construction of new power facilities until after the war.

Those public-owned agencies which were already in business and receiving Columbia River power continued to make steady reductions in rates in the face of rising costs attendant on the war.

During the year public ownership progress was steady. Eleven public agencies in Washington and Oregon were successful in purchasing either all or part of privately owned utility systems. Two other Oregon Peoples' Utility Districts approved revenue bond issues for the purchase of existing utility properties for \$885,000. During the year, 17 public agencies executed new contracts and 9 public agencies revised existing contracts with the Bonneville Administration for the purchase of power. The Administration's power deliveries to public agencies increased in the 1942 fiscal year.

The Year's Power Sales

Both from the standpoint of actual power deliveries and from the standpoint of "demand value" of contracts executed, the Administration's power sales showed heavy gains during the fiscal year 1942.

Of power actually delivered, war industries, comprising principally aluminum and shipbuilding, purchased 81.4 percent; private utility companies, 14.7 percent; public agencies, 3.8 percent; and Federal agencies, 0.1 percent.

Twenty-six new power contracts were executed during the year, bringing the cumulative total of signed contracts to 70.

TABLE 1.—New prime power contracts executed fiscal year 1942

Class	No.	Class	No.
Districts.....	6	Industries.....	4
Cooperatives.....	11		
Federal agencies.....	5	Total ¹	26

¹ In addition to these, four public utility district contracts, four REA cooperative contracts, two contracts with municipalities, one industrial contract and one contract with a private utility were revised as to contract demand.

The War Market

By June 30, 1942, industrial power contracts and commitments dominated the Administration's marketing program and construction plans. Industrial loads, all of them for war production, accounted directly for 92 percent of current contracts and commitments for 899,920 kilowatts.

The economics of the Pacific Northwest and of the electro-process industries of the country had long indicated that industrial power sales would play a major role in the development of the Northwest region.¹

At the close of the 1941 fiscal year, the Bonneville Power Administration had reported to the Department of the Interior some 20 types of industry which, by reason of their raw material, power and market needs, were especially feasible of establishment in the Pacific Northwest.² During 1942, the Bonneville Power Administration agreed to serve 5 of these 20 types of industry.

Shipyards Added to Load

In addition to industries of the "electro" type, the war brought a new market for power in the development of a huge shipyard industry. The Administration agreed to serve three shipyards in the Portland, Oreg.-Vancouver, Wash., district. The three new yards required a total supply of power which would not have been available in the lower Columbia district had it not been for the Bonneville project. New electric welding processes which require large blocks of electricity have reduced shipbuilding time from 250 days to as low as 10 days.

¹ See improvement of Columbia River at Bonneville, Oreg., War Department, Corps of Engineers, 1935-38; Annual Report of the Federal Power Commission, Fiscal Year Ended June 30, 1938; Annual Reports of the Administrator of the Bonneville Power Administration, 1938-41.

² See Annual Report of Bonneville Power Administration, 1941.

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In detail, the Bonneville Administration's industrial power sub-position on June 30, 1942, was as follows:

TABLE 2.—Industrial contracts in effect, June 30, 1942¹

Name	Date power contract signed
Aluminum Co. of America, unit 1.....	Dec. 20, 1941
Alcoa, unit 2.....	Apr. 16, 1942
Alcoa, units 3, 4, and 5.....	Oct. 21, 1942
Alcoa, overload units.....	Apr. 3, 1942
Do.....	Jan. 30, 1942
Pacific Carbide & Alloys Co.....	July 6, 1942
Pennsylvania Salt Manufacturing Co.....	Dec. 18, 1941
Reynolds Metals Co.....	Feb. 24, 1942
Do.....	Mar. 10, 1942
Oregon Shipbuilding Co.....	May 20, 1942
Electro Metallurgical Co.....	May 29, 1942
Do.....	do
Pennsylvania Salt Manufacturing Co.....	Oct. 17, 1941
Defense Plant Corporation.....	Feb. 18, 1942
Kaiser Co.....	May 8, 1942

¹ In addition, Defense Plant Corporation was being supplied with power in eastern Washington as to fiscal year ended, prior to formal signing of contract. Other commitments also had been made (see table 3).

Market Development Emphasized

In order to provide a solid foundation for the new electro industries of the region and to insure their continuous operation, technicians of the Administration assisted materially in the establishment of other industries, the products of which are critically needed in the manufacture of the materials and chemicals produced because of the availability of Columbia River electric power.

A proposal for a coke plant sponsored by a local industrial group was prepared, presented and carried through to approval by war agencies with the assistance of the Administration.

Similarly, ferro-alloys manufacturers and calcium carbide producers were assisted in obtaining suitable grades of raw materials in Oregon and Washington. Bonneville technicians also cooperated in the establishment and expansion of a plant in Utah, for the production of alumina from alunite ores and clays. This was a significant step since inexhaustible deposits of aluminum bearing clays are available on the Bonneville transmission system in the Castle Rock region of Washington. All these activities were undertaken with the firm conviction that suitable low-cost raw materials could be made available from the area's natural resources for the metallurgical and electro-chemical plants in the region to insure their continuity of operation.

These activities were carried on in conformance with the policy expressed by the Secretary of the Interior that the west is not only

building for the war, but for its future and that of the Nation. Every electro industry established during the past 4 years in the Pacific Northwest is part of a pattern of industrial development providing for the complete processing of Northwest resources from raw materials to consumer goods.

The Public Power Market

At the close of the year a total of 53 contracts between the Bonneville Administration and public utility districts, municipalities, cooperatives and Federal agencies had been executed.

Seventeen contracts with public agencies were executed during the 1942 fiscal year.

By the end of the year the cumulative total of Bonneville's public agency contracts included 17 with utility districts, 12 with municipalities, 19 with cooperatives, financed in all but one case by the Rural Electrification Administration, and 5 with Federal agencies.

Twenty-six of these fifty-three public agencies were distributing Columbia River power and nine cooperatives and two public utility districts were assured of Columbia River power almost immediately through interconnection agreements between the Bonneville Administration and privately owned utilities.

As of June 30, 1942, the Administration's contracts to public distribution agencies were as follows:

TABLE 3.—Contracts with public agencies¹

PUBLIC UTILITY DISTRICTS

Name	Date executed ²	Date energized	Name	Date executed ²	Date energized
Skamania	Apr. 14, 1942 ³	Jan. 3, 1940	Clark	Apr. 17, 1941	.....
Pacific No. 2.	Sept. 8, 1941 ³	Oct. 17, 1940	Cowlitz	Apr. 28, 1941	Aug. 11, 1941
Wahkiakum	Nov. 10, 1939	Nov. 12, 1940	Yakima	July 9, 1941	.....
Klickitat	June 18, 1942 ³	Nov. 6, 1940	Clatskanie	Mar. 17, 1942	.....
Tillamook	May 15, 1940	.....	Central Lincoln	do .....	.....
Kittitas	Oct. 3, 1940	June 19, 1941	Union Co.	do .....	.....
Lewis	Oct. 4, 1940	May 1, 1941	Whatcom	May 19, 1942	.....
North Wasco	Oct. 28, 1940	.....	Grant Co.	June 17, 1942	.....
Grays Harbor	Nov. 7, 1940	Nov. 9, 1940			

MUNICIPALITIES

Cascade Locks ⁴	Feb. 14, 1939	July 26, 1939	Tacoma	Mar. 5, 1940	Mar. 9, 1941
Forest Grove	Nov. 7, 1939	Nov. 27, 1939	Seattle	May 6, 1940	May 25, 1941
Canby	Dec. 22, 1939	Feb. 1, 1940	Ellensburg	Aug. 1, 1940	May 27, 1941
Monmouth	Jan. 5, 1940	Dec. 4, 1940	Eugene	Aug. 20, 1940	Dec. 6, 1940
McMinnville	Jan. 13, 1940	Oct. 18, 1940	Drain	Mar. 15, 1941	Apr. 1, 1941
Centralia	Feb. 13, 1940	Jan. 1, 1941	Grand Coulee	May 1, 1941	Jan. 6, 1942

¹ In addition to these, contracts have been signed with 6 war agencies. These include Army air bases, Coast Guard stations, navy yards and cantonments.

² Contracts are listed in order in which they were originally signed.

³ Revised.

⁴ Contract provides prime, secondary, and dump power.

TABLE 3.—Contracts with public agencies¹—Continued

COOPERATIVES

Name	Date executed ²	Date energized	Name	Date executed ²	Date energized
Benton-Lincoln.....	June 27, 1940	Oct. 12, 1940	Blachly-Lane Co-op.	Oct. 7, 1941	-----
Columbia R. E. A.....	Oct. 1, 1940	July 17, 1941	Lane Co. Co-op.	May 1, 1942	-----
Wasco Elec. Co-op.....	Oct. 2, 1940	May 24, 1941	Okanogan R. E. A. . .	June 15, 1942	-----
Inland Empire.....	June 5, 1942 ³	-----	Umatilla R. E. A. . .	do.....	-----
Nehalem Valley.....	Oct. 7, 1940	Feb. 1, 1941	Big Bend Elec. Co-op	June 17, 1942	-----
Nespelem Valley.....	Feb. 19, 1941	Sept. 12, 1941	Kootenai R. E. A. . .	June 18, 1942	-----
Salem Elec. Co-op.....	Mar. 17, 1941	Mar. 29, 1941	Stevens Co.	June 5, 1942	-----
Lincoln Elec. Co-op.....	May 30, 1942 ³	Apr. 3, 1942	Idaho Co. L. & P. Co.	June 8, 1942	-----
North Douglas.....	Mar. 18, 1942 ³	July 15, 1941			
West Douglas.....	Aug. 29, 1941	Sept. 2, 1941			
Benton R. E. A.....	June 15, 1942 ³	-----			

Progress of Public Agencies

The public agency market for Columbia River power is largely dependent upon the ability of public-owned electric utilities to enter active business and become purchasers of power at wholesale.

For this reason the Administrator continued to accede to the wishes of the local utility districts, to serve as their official negotiator for the purchase of privately held utility systems.

One municipality, six cooperatives, and four public utility districts in Washington and Oregon reported success during the fiscal year in purchasing either all or part of privately owned utility systems.

The Skamania, Grant, Lewis, and Klickitat County Public Utility Districts, the city of Grand Coulee municipal system, the Orcas Light & Power Co. (REA), and the Stevens County Electric Cooperative each purchased all or part of privately owned utility systems in Washington. In Oregon the Central Electric, Coos Electric, Lane County Electric, and North Douglas Electric Cooperatives all completed purchases of all or part of utility systems.

The Clatskanie Peoples' Utility District and the West Coast Power Co. reached agreement to purchase the company's Clatskanie division for \$150,000 and the Central Lincoln District agreed to purchase the company's coast division for \$735,000. Revenue bonds were approved by voters in the two districts.

The Tillamook (Oreg.) Peoples' Utility District also reached an agreement to purchase practically all of the Mountain States Power Co. properties in Tillamook County for \$625,000.

The Public Agencies' Operating Record

On June 30, 1942, 26 public agencies had been distributing Columbia River power for periods up to 36 months. The success shown in their operations records was significant in its illustration of the possibilities which the public power market holds for the distribution of Columbia River power. Since the Federal statute under which the Bonneville

Administration operates makes public agencies and cooperatives the Administration's preferred market, the record of these first small public-owned utilities assumed double significance.

In 1939, 1940, and 1941, and the first half of 1942 the public electric systems in Oregon and Washington made rate reductions amounting to more than \$1,417,000. As a result of these reductions power consumption increased, thus permitting gross revenues to remain stable.

Substantial reductions in rates have been made by the public systems of Canby, Cascade Locks, Columbia County REA, Cowlitz County PUD, Drain, Forest Grove, Ellensburg, Eugene, Grays Harbor PUD, Kittitas County PUD, Lewis County PUD, McMinnville, Monmouth, Nehalem Valley REA, Pacific County PUD, Seattle, Skamania PUD, Tacoma, Wahkiakum PUD, Centralia, Douglas Electric Cooperative, Salem Electric Cooperative, Columbia County REA, and the City of Grand Coulee.

The Clark County Public Utility district signed contracts during the fiscal year to supply Columbia River power to a Federal Public Housing Authority project at Vancouver, Wash., and to one war industry. The housing project, which may be enlarged, included 1,000 permanent houses, 4,000 temporary houses, dormitories for 4,400 men, and 2,000 units of family apartments. These contracts gave the district a greater load than that supplied by the two private utility companies serving Vancouver.

One of the private utilities offered to supply the load for the 1,000 permanent houses for about \$84,600 a year. The district is supplying this load for approximately \$36,190. Housing Authority officials say it is the lowest power rate it has received in the United States.

During the year Monmouth, Oreg., made its second rate reduction. McMinnville, Oreg., also effected its second rate reduction since contracting for Bonneville-Grand Coulee power. The reduction brought McMinnville rates into line with the Bonneville standard resale rate and resulted in a further substantial saving to customers.

Typical of rural cooperative performance was the record of the Wasco Electric Cooperative in the mid-Columbia River valley. During the first 12 months of its operation with Columbia River power, the Wasco cooperative brought electricity to 365 Wasco County farmers who had never before had access to electricity. Nearly 340,000 kilowatt-hours were sold by the cooperative. Revenues totaled nearly \$10,000.

Cascade Locks (Oreg.) City Light, by June 1941, had reduced rates 31 percent, yet as a result of increased use of electricity by customers maintained its revenue from power sales.

Customers of this municipal system with their June 1942 bills received another reduction of 15 percent in commercial rates.

Future Industrial Sales

During the early months of the 1943 fiscal year the Administration expected to execute power sales contracts for the delivery of Bonneville and Grand Coulee energy to new war industrial plants, in addition to additional blocks of power to existing industrial customers. The Administrator had made definite commitments during 1942 to supply these plants and additions. It was expected that the full demand would be required by these plants before the middle of the 1943 fiscal year.

Contracts for these new plants were in advanced negotiation at the close of the fiscal year 1942. Several of the plants were actually under construction. The list follows:

TABLE 5.—Industrial contracts pending, fiscal year 1943

Company	Type of operation
Kaiser Shipbuilding Corporation.....	Shipbuilding.
Defense Plant Corporation.....	Reduction of aluminum oxide. ¹
Do.....	Reduction of aluminum oxide.
Do.....	Aluminum rolling mill.
Do.....	Magnesium.
Do.....	Ferro-silicon.
Oregon Electric Rolling Mill.....	Steel rolling mill.
Defense Plant Corporation.....	Reduction of aluminum oxide.
Oregon Shipbuilding Corporation.....	Shipbuilding.

¹ Energized May 1, 1942.

Prospective power sales to war and other industries in the Northwest for the fiscal years beyond 1944 were, of course, progressively more difficult to estimate. For this reason, in planning future generating and transmission capacities, the Administration endeavored to plan a power system of sufficient flexibility to supply not only normal load growth, but any fluctuations in load which might grow out of a war need extending over a number of years.³

Other Future Sales

The Bonneville Administration's estimates of power sales from its own system for the years 1943 through 1945 included four other classes of customers. These were non-Federal electric utilities, public power agencies, military establishments, and war housing projects which, among them, were estimated to require a combined peak delivery of 576,200 kilowatts by 1945.

³ For details see Six-Year Construction Program for Bonneville Power Administration, revised as of June 1942.

Service for Future Loads

In conformance with Executive Order No. 8455, the Bonneville Administration during the 1942 fiscal year revised its 6-year construction program in the light of new factors which developed during the year.

These new construction estimates of the Administration were conditioned by two fundamentals: First, the fact of the war need, and second, the fact that almost no other utility within the region has definite plans for expansion of its generating capacity.

These two factors meant that both normal growth in power consumption within the region and growth in power demand incident to a war of uncertain duration would have to be met in their entirety by the region's Federal power projects.

In planning future generation and transmission capacity, therefore, the Bonneville Administration planned to fill not only the needs of its own customers but the expanding needs of the region as well.

In the formulation of these plans three things became at once apparent: (1) that immediate material shortages would compel slight reductions in the over-all power consumption of the region in 1943 and 1944 below the Administration's estimates of June 1941, which were made contingent upon a recommended earlier installation of generators; (2) that beginning with 1945 the region's power needs would increase, in an annually expanding ratio, above the Administration's estimates of June 1941; and (3) even with the slight reduction of use in 1942 and 1943, additional generating capacity would be required in the Pacific Northwest over and above both existing and authorized capacity.

At the end of 1944, including units definitely approved for construction at the end of the 1942 fiscal year, the installed capacity of Bonneville and Grand Coulee Dams will be an insufficient total in view of the region's predictable needs.

New Generating Capacity Needed

Because of the potential power shortage in the region, the Bonneville Administrator jointly with the Bonneville Advisory Board, on February 10, 1942, urged that studies be completed on the 10 hydro-electric power projects in the Northwest which are known to be feasible of early construction. In addition the Administrator recommended immediate construction of another dam on the Columbia River accessible to the existing Bonneville-Grand Coulee transmission system and to the larger load centers of the region.

It was further recommended that new generator installations should be scheduled immediately because of the time required to complete

such installations. Only in this way could an adequate supply of power be assured for what might be the critical years of 1946 to 1949.

To carry this tremendous capacity from the power stations on the Columbia River to the power market centers of the region, extensive additions to transmission and terminal facilities of the Pacific Northwest will be required.⁴

The Year's Construction

The congressional appropriation of almost \$23,000,000 received by the Bonneville Administration at the start of the 1942 fiscal year instituted a construction program almost twice that of the previous fiscal year.

This enlarged program was again increased by an additional appropriation of \$30,000,000 in December 1941. Since the war program required the use of critical materials for the production of war goods, the Administration's program was limited after December 7 to only those extensions of its system which contribute directly to the prosecution of the war. As a result the Administration held in reserve a considerable portion of its construction funds at the end of the fiscal year pending determination of their detailed use.

New Facilities Energized

The Administration placed 586 miles of transmission line and 530,050 kva of substation capacity in service during the fiscal year. This represents an average of 2.3 miles of transmission line and 2,100 kva of substation capacity completed for each working day.

At the close of the fiscal year the Administration operated a transmission system containing 1,748 miles of transmission lines and 37 substations.

Design work was in progress on 13 substations and 19 major substation additions and on 8 transmission lines totaling 437.3 miles in length.

Construction was in progress on substations and additions and on transmission lines having a total length of 629.7 circuit miles.

The Year's Operations

As an operating utility the Bonneville Administration faced new operating problems affecting both the agency's management procedures and its electrical operations.

Until the last quarter of the fiscal year the organization was expanding to meet the immediate needs of building new transmission

⁴ For detailed discussion of estimates of generation and transmission see Bonneville Power Administration construction program revised as of June 1942.

facilities to serve war industries. During that period production increased markedly until it reached a processing peak of obligating over \$7,000,000 per month. New production records were attained and all commitments to war industries fulfilled on schedule.

When the national shortage of copper, steel, aluminum and other metals became critical, however, these production levels began to decline until, during the latter quarter of the year, previously approved construction plans had to be postponed with a resultant tapering off in personnel and production.

Some copper, aluminum, steel and other critical materials originally ordered under proper priorities of the War Production Board could not be used under the curtailed program of construction later initiated by the same agency. A complete inventory of these materials was made and submitted to the War Production Board, and arrangements made to make it available to other war agencies as needed.

Financial Statements

Studies were continued during the year for the purpose of further simplifying the Administration's accounting methods.

Financial or general ledger accounts were kept in accordance with requirements of the General Accounting Office and cost accounts were kept in conformance with the Federal Power Commission's system.

The Power Supply and the Future

Both the law and the power economics of the Pacific Northwest make it mandatory upon the Federal Government to provide sufficient generating and transmission facilities to supply the region's ever-increasing power demands, whether for war or for peace.

In terms of immediate need, competent studies ⁵ forecast a serious shortage of power for war production by 1944 unless new power sources are immediately developed throughout the Nation.

In terms of post-war requirements, the Bonneville Administration's own studies ⁶ indicate a need of nearly 5 million kilowatts for normal use in the Northwest in 1949.

The Administration does not anticipate any power surplus when the war ends. Generators now installed or being installed are worked to capacity. Even the end of the war and the possible slow-down of a number of industrial plants would permit only a normal and necessary reserve of power and withdrawal of generating units for necessary reconditioning and replacement of worn parts.

⁵ Will Electric Power Be a Bottleneck? by Louis Marlio, Brookings Institution, Washington, D. C., 1942.

⁶ See Bonneville Power Administration's 6-year construction program, revised as of June 1942.

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3. New feasible industries should be financed and managed as far as possible by business men of the region.

4. Research on new processes to use electric power and raw materials in the region must be stimulated by governmental agencies and the results of such research should be freely available for use by independent enterprise.

5. The opposition of established industry to new competition from Northwest industry and the attempts of any industrial groups to control large amounts of Columbia River power must be prevented.

6. Within the region, new industries should be encouraged to decentralize in accordance with the advantages of locational factors and of the "postage stamp" rate of the regional network.

7. Columbia River power should be sold on such terms as contribute to the conservation of other resources of the region and as prevent the destruction of scenic and recreational assets.

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SUPERVISION exercised by the Division of Power over problems involved in the development of electrical energy by agencies under the jurisdiction of the Department of the Interior acquired even greater significance when the attack on Pearl Harbor transformed a condition of national emergency into a state of total war. Already established by the Secretary of the Interior in April 1941 to promote efficient coordination of the Department's power production activities, the Division was able to gear its organization to aid in the prosecution of the war program without loss of time.

Power for War

During the fiscal year the activities of the Division of Power were dedicated to the fulfillment of the purposes for which it was created, intensified by the war and the urgency that it has brought for the development of additional power for war uses and the achievement of the maximum utilization of existing plants for that purpose. During the year the installed capacity of power projects under the jurisdiction of the Department was increased by more than 500,000 kilowatts. Perhaps the most significant step in the power program during the year was the beginning of operations at Grand Coulee Dam on the Columbia River in Washington.

The Division has been constantly engaged in working for the construction of power projects which will require a minimum quantity of critical materials and can be completed with sufficient speed to warrant construction for the war program. In the fall of 1941 a comprehensive program was worked out in conjunction with the Bureau of Reclamation and the Bureau of Mines to develop 1,480,000 kilowatts of additional electric generating capacity throughout the Western States and to use it for the extraction and beneficiation of strategic minerals. This program included the more rapid completion and expansion of projects now under way and proposed immediate authorization and

construction of projects still in the planning stage. It also called for the integration of the Federal power resources by transmission networks. The Division has aided in the preparation of specific proposals for the development and greater industrialization of the Western States insofar as the use of power facilities is involved.

The Department's work on programs relating to the furnishing of power for war involves continuing contact and cooperation with other Government agencies, particularly the War Production Board, the Reconstruction Finance Corporation and its subsidiaries, and the Federal Power Commission. The Division serves as liaison between various agencies of the Department and the war agencies which are centralized in Washington. This work of the Division has made it possible to continue the Department's policy of decentralizing the administration of its power activities.

Arrangements for the supply of power to the magnesium plant near Las Vegas, Nev., were worked out in conjunction with the Bureau of Reclamation, the allottees of Boulder power, and Defense Plant Corporation. This transaction constitutes one of the largest single sales of power to a consumer ever consummated. Negotiations extended over a period of 6 months and at the end of the year the principal agreement and three subordinate agreements were ready for execution.

Extensive negotiations with the War Production Board were, and still are, carried on to assure the maximum war use of the Columbia River power developments through the installation of additional generators at Bonneville and Grand Coulee Dams. Authorization was secured for the installation of generators at Bonneville which will raise the capacity of the plant. Authorization of more generators for Grand Coulee was also obtained, but when it became apparent that other war demands would delay the completion of these, the Division participated in an arrangement whereby generating units designed for the Central Valley project in California, and ready ahead of time through the foresight of the Bureau of Reclamation, were transferred to the Grand Coulee powerhouse to bring power to the new metallurgical and shipbuilding industries in the Northwest sooner than could otherwise have been done.

In seeking the full utilization of the Department's power resources the Division has sought to have war plants located on a sound basis, looking to lowering costs to war industries and the development of a balanced economy in the regions involved. It has also endeavored, to the fullest extent commensurate with war production needs, to secure the location of plants which might continue to operate after the war and thereby contribute to the post-war readjustment and to safeguarding the Government's investment in the facilities.

Every effort has been made to effectuate the consolidation or pooling of the power resources of the Department in such a manner as to

secure the greatest efficiency and to make available maximum quantities of power in various areas. The appropriate war agencies have been kept fully and promptly advised of the quantity and location of power available from the Department's projects and have otherwise had the benefit of complete information as to the capabilities of these projects. Initial steps in the creation of a power pool in the State of Arizona had been taken at the end of the year. Similarly, a plan for consolidation of the power resources of the Department in Wyoming was under study. At the same time, the Division has insisted that power from the projects in the Department be sold to the war agencies and contractors at the lowest possible rates in order that the cost of war materials and supplies produced with the power might be held to the lowest feasible level.

Members of the Division's staff advised the Secretary of the Interior upon the power problems of the Island of Puerto Rico which became acute largely due to the stringency of the oil supply on the island. In order to conserve oil and to make the utmost use of the power facilities, it became necessary that all of the facilities be completely integrated. At the request of the Territorial Government and the Federal Works Agency, the Division assisted in formulating a program for the integration of the properties of the two utility companies which served a portion of the island with those owned by the Territorial Government for the wartime welfare of the island.

Hetch Hetchy

The city and county of San Francisco submitted to the voters in November 1941 the plan for acquisition of a distribution system which the Secretary of the Interior had found would comply with the terms of the Raker Act. After the rejection of the charter amendment to put the plan into effect, a bill was introduced in Congress to relieve San Francisco of the statutory requirement to distribute solely for the public benefit the power developed through the storage of water in Yosemite National Park. Hearings were held by the Public Lands Committee of the House of Representatives at which the Department opposed any change in the conditions under which the use of national park lands had been granted by Congress. At the conclusion of the hearings, the bill was not reported out of committee.

Thereafter, largely through the efforts of the Division and in accordance with the suggestion made by the Secretary of the Interior at the hearing upon the bill to amend the Raker Act, arrangements were worked out for an aluminum reduction plant to be constructed by the Defense Plant Corporation to utilize Hetch Hetchy power in accord with the Raker Act. The Department, through the staff of the Division, and the Department of Justice then joined with the

city in petitioning the Federal District Court for a further stay of the injunction against the city, to prevent loss of revenue to it pending completion of the plant. The court granted an additional stay of 1 year, within which time all Hetch Hetchy power will be disposed of through a direct sale to the Government-owned aluminum plant.

Central Valley Project

Even with two of its generating units temporarily transferred to Grand Coulee, the Central Valley Dams will supply one of the largest single blocks of power that will become available for war production. Every effort has been made to expedite the completion of the Shasta and Keswick Dams and to secure the priorities for materials necessary to the generation of electric energy which the War Production Board has agreed is vitally needed in California. An appropriation was obtained to begin the construction of transmission lines to bring the power to load centers and for engineering work on a steam standby station which is a necessary adjunct to the project if the full benefits of the power development are to be secured for the people of the area and if power is to contribute an appropriate share to the repayment of the cost of the entire project. Comprehensive studies were under way, including studies relating to the marketing of the power and the rates at which it will be sold. Emphasis is being placed particularly on the most effective use of the power for war purposes.

General

As the clearing house for the increasing body of complicated problems incident to the power activities of the Department, the Division of Power had handled matters relating to the Park Service, the Office of Indian Affairs, the Bureau of Reclamation and the Bonneville Power Administration. All problems relating to the power projects of agencies of the Department, which are of sufficient importance to require the attention of the Secretary, have been cleared through the Division. Further steps were taken to obtain a smooth-running procedural relationship between the Office of the Secretary and the agencies of the Department dealing with power, and to establish machinery which will permit coordination of the many matters which are of concern to more than one of the agencies of the Department.

The review of applications for the use of public lands by utility companies and other power agencies was continued. A large number of contracts for the sale of power from reclamation projects was also studied and reviewed. Suggestions were made from time to time looking toward the establishment of uniform policies and practices in power sales. Further steps were taken for the effectuation of the

policy of including in contracts with distributors of power at retail, provisions relating to the rates at which the power is to be resold, the aim being to prevent excessive profits from resale of Government power in the development of which public funds and public resources have been utilized. A study of the wholesale rates for power generated on a number of projects in the Department was begun, in collaboration with the Bureau of Reclamation, to determine whether adjustments could be made in accordance with the Reclamation Project Act of 1939.

Preparations were made for the Division to appear for the several interested agencies of the Department of the Interior at a hearing before the Federal Power Commission on the application of the State of Arizona for a license to dam the Colorado River at Bridge Canyon.

At the request of the members of Congress who are sponsoring the legislation, representatives of the Division attended and participated in the hearings on the bill to establish a Columbia Power Administration to market power from the Bonneville and Grand Coulee projects. The measure would permit the administration in charge of marketing Bonneville and Grand Coulee power to acquire private utility systems in the Northwest and resell to public agencies and cooperatives the distribution properties. The generating and transmission facilities would be retained by the Federal agency and would be coordinated with the Federally constructed system. This integration of facilities would enable the area to produce an increased quantity of power now so vitally needed for war uses. The Division also participated in the work of the Department pertaining to a number of other legislative matters affecting power interests, including the proposed amendment of the Raker Act.

The Division of Power has participated in a large measure in the work of the War Resources Council of the Department which has effectively made available for use in connection with power and other natural resource development problems the advice and data of the entire Department.

Geological Survey

W. C. MENDENHALL, Director

A SUMMARY of the work of the Geological Survey during the fiscal year 1942 indicates how completely the energies of this scientific and technical unit of Government have been directed toward the paths of war. An organization that for more than 60 years has been conspicuous among comparable organizations in the world in its contributions to scientific advancement in the fields of geology, paleontology, physiography, petrography, hydrology, hydrography and the techniques of mapping, the Survey now is applying its accumulated knowledge, its trained personnel, and its developed skills to war problems.

The processes of research are the same whether they are applied to the ends of war or to those of peace. The scientist's desire is to serve mankind. He strives to extend the fields of knowledge in order that life may be richer and better ordered. But the new natural laws and products that he reveals may be seized and used by destructive as well as by constructive forces. The gangster as well as the policeman can use a gun.

Now the scientist and the technician in field and laboratory everywhere in the world are carrying on a highly important although nonspectacular part in the struggle. The Geological Survey is enlisted in this effort. Through close cooperation with other agencies of Government engaged in other phases of the same endeavor, it is reevaluating and reporting upon all of the significant deposits of deficient and critical minerals, vigorously mapping strategic areas within and without the United States and its possessions, and supplying specific information, here and abroad, on terrain, water supplies, building materials and other elements affecting use of lands for war industries or military occupancy.

Geologic Branch

The major activity of the Geologic Branch this year was in the field of minerals vitally needed for war. Owing to the great increase in

requirements and the cutting off of many foreign supplies, this field now includes all the minerals previously recognized as strategic, ores of common metals, and many minor elements that until recently had been adequately supplied. As the problems involving these natural resources have increased, the experienced and specially trained staff of the Geologic Branch increasingly concentrated on them both in the United States and other American Republics, and peacetime activities were reduced to a minimum. A new development was work in military geology, involving the preparation of special reports and maps for the armed services. The geologic programs conducted in cooperation with different States were also focused, so far as practicable, on war minerals and war problems.

War Minerals

The investigations of strategic mineral deposits were financed by an appropriation of \$245,000, of which \$35,150 was allotted to the Alaskan Branch. In addition, about \$150,000 of the appropriation for "geologic surveys" was used for strategic mineral studies in field and laboratory.

Close contact was constantly maintained between the Geological Survey and the Bureau of Mines, the War Production Board, the Reconstruction Finance Corporation, and other agencies, and many field examinations of ore deposits were made at their request. Where field conditions seemed to warrant it, recommendations were made to the Bureau of Mines for drilling or otherwise exploring certain ore deposits, and geologists were assigned to these operations to study cores and excavations and make appropriate recommendations as the work progressed.

Although iron, copper, lead, and zinc had not heretofore been included in the list of strategic minerals, the rapidly growing need for increased supplies of those metals led to the field study of a number of iron deposits and to the formulation of plans for intensive studies of all these metals during the fiscal year 1943. For this purpose increases in the staff were made toward the close of the fiscal year 1942.

Most of the iron-ore districts examined this year were in the Western States. These districts include the deposits at Canyon Creek, Ariz., Eagle Mountains, Calif., Dayton, Nev., Jones Camp, N. Mex., Scappoose district, Oreg., and Bull Valley, Utah. The geologic examinations were made in advance of and during exploration work of the Bureau of Mines. They provided basic data essential to the planning of an iron and steel industry in the West. Iron-ore deposits in northeastern Alabama and in the Cartersville district, Ga., were also examined.

A program for exploring domestic sources of aluminum developed rapidly during the year. Late in 1941 the Survey collaborated with the Bureau of Mines in a field inventory of the known reserves of bauxite, the only ore from which aluminum is now obtained. The inventory revealed a potential shortage of domestic reserves, and consequently a joint program of exploration was started in November 1941, with funds especially appropriated by Congress. The program includes, in addition to explorations for bauxite, investigations of high-alumina clays and alunite, which are potential sources of aluminum. The geologic explorations for bauxite were conducted by nine field parties in Arkansas, Alabama, Georgia, Mississippi, Tennessee, and Virginia. Four deposits recommended by the Survey were drilled by the Bureau of Mines. Field examinations of high-alumina clays were made in California, Idaho, Mississippi, South Carolina, and Washington, and of alunite deposits in several Western States. The program is to continue through 1943.

The rising demand for magnesium is expressed in the Survey work during the year in widely different ways: In the State of Washington, for example, magnesite deposits were studied and reserves estimated; in Utah, members of the Survey staff worked in shifts at a test well of the Defense Plant Corporation, seeking to appraise the magnesium and potash in cores and brines; in the Las Vegas area, Nev., a search was begun for salt, a raw material needed in large quantities at the new plant of Basic Magnesium, Inc.

The outstanding results from work on deposits of manganese in 1942 were obtained in the Batesville district, Ark. Cooperative work with the Bureau of Mines on prospecting for wad-type ores continued from 1941 until February 1942, and geologic work is still in progress. The tonnage and grade of reserves indicated by prospecting and geologic work were such as to warrant recommendations to the Metals Reserve Co. and Defense Plant Corporation for systematic large-scale development. The recommendations were accepted, a metals reserve stock pile has been established, and systematic development has begun.

Domestic chromite production made a major advance this year when a chromite concentrating plant was completed at the Benbow mine, in the Stillwater district, Mont. This mill is now producing 150 to 175 tons of chemical-grade chromite concentrates daily. It is the largest chromite mill in the country and the first of three now planned for the Stillwater deposits. The Stillwater deposits are the largest single domestic reserve of chromite and are known to contain millions of tons of ore. The explorations initiated in 1939 by the Geological Survey and later carried on jointly by it and the Bureau of Mines were largely instrumental in bringing the district into production so quickly.

A similar advance was made in the domestic tungsten industry by the initiation of large-scale production from a mine near Yellow Pine, Idaho, in which tungsten had been discovered as a result of the cooperative work of the Geological Survey and the Bureau of Mines. At the close of the fiscal year, this property was the largest single producer of tungsten concentrates in the country. Work was also carried on in other tungsten districts in Washington, Idaho, Utah, Nevada, California, Colorado, and Arizona. One of the geologists engaged in tungsten investigations perfected, during the year, a simple apparatus that permits field estimation of the molybdenum content of scheelite (calcium tungstate) concentrates, a matter of some economic importance, in that an excessive molybdenum content subjects scheelite concentrates to a price penalty.

In the larger quicksilver districts of California, Nevada, and Oregon, the detailed mapping of the districts was followed by intensive geologic studies of individual mines. Detailed district and mine examinations were also started at Terlingua, Tex., and will be continued during the coming year. Many small and widely scattered properties in the Western States were inspected by joint parties composed of a Survey geologist and a Bureau of Mines engineer. These inspections, made mainly to select the more promising localities for detailed work, also added much specific information to the records of quicksilver deposits.

Among the minor metals particularly valuable because of peculiar properties, cobalt and vanadium deserve special mention. During scientific research on manganese minerals, in which X-ray and other refined methods of study were used, it was found that some manganese ores contain cobalt in such quantities as to be possible ores of cobalt. Tests of certain cobalt-bearing manganese deposits are to continue in the coming year. For vanadium, likewise, modern technique speeded scientific search. This was especially true in the examination of several hundred titaniferous magnetite specimens from many iron deposits, which were tested by spectrographic methods at the Department of Mineralogy and Petrography of Harvard University. The vanadium-bearing phosphate rock of southeastern Idaho and western Wyoming, about which much is known through years of field study, is also being tested in a cooperative project with the Bureau of Mines. Investigations of domestic beryllium, lithium, and tantalum sources were begun in the spring of 1942 and will be combined in part with the work on strategic sheet mica.

A wide variety of nonmetallic minerals, of immediate or potential value in the war, were examined in the field and laboratory. These minerals include fluorspar in western Kentucky; graphite in Alabama, New York, and Pennsylvania; phosphates in Idaho and Wyoming;

sheet mica in New England and North Carolina; talc in California and Nevada; and topaz in South Carolina.

The diversity of the wartime geologic work is illustrated also by some of the assignments of the fuel specialists, which included studies of occurrences of oil in certain areas in and adjoining Naval Petroleum Reserve No. 1 in California; geologic conditions near Mount Pleasant, Utah, in conjunction with the drilling of a test well by the Bureau of Mines in search of coking coal; and a survey in cooperation with the Bureau of Mines of sources of helium-bearing gas. In cooperation with the Geological Survey of Pennsylvania, geophysical investigations led to the drilling of a productive oil well.

American Republics

The projects of the Geological Survey in the American Republics, which are sponsored by the Department of State, are part of a broad, long-range program designed to further the cordial relationships between the countries and to provide basic mineral data of mutual value. During this year the work was entirely on the ores of war metals: manganese and nickel in Brazil; chromite, manganese, and tungsten in Cuba; manganese in Costa Rica; antimony, manganese, and quicksilver in Honduras; and antimony, chrome, quicksilver, tin, and vanadium in Mexico. The work was directed in part toward aiding increased production.

Examinations in Brazil were typical of the broader studies that anticipate future needs. In one study the reserves of manganese ore at an extremely large, undeveloped deposit were evaluated. At another the nickel silicate ores of a deposit that is possibly the largest of its type in the Western Hemisphere were studied in detail.

The chromite project in Cuba, continued from last year, was noteworthy for the close application of scientific geology to the production problems of operating companies. One feature of the cooperative work with the companies was the application of geophysical methods to chromite prospecting. These methods offer promise of considerable success within a certain limited field.

Military Geology

Since early February, 6 to 20 geologists have been engaged in the preparation of reports and maps on the military geology of many areas, in response to requests from the Intelligence Branch of the Army Engineer Corps, Air Forces, Naval Intelligence, Board of Economic Warfare, Engineer Board at Fort Belvoir, and the Army and Navy Munitions Board. The demands on this group for strictly military geology have increased steadily.

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Alaskan Branch

What is the work of the Alaskan Branch and wherein and how during the past fiscal year has it served the national interests in these times of national need? Viewed broadly, the work is and long has been focused on determining the kinds, distribution, quantity, and characteristics of the various mineral commodities that Alaska contains which have contributed to or may contribute to the welfare of our citizens. It is no idle boast that our entire present-day civilization rests upon the availability of mineral materials from which our machines may be made, our structures built, and our system of life supported. Indeed, even the other basic industries, such as agriculture, depend in large measure on the mineral composition of the soils, the physical configuration of the terrain, and the supplies of that most indispensable of all minerals—water. Without the mineral products the cultivation, garnering, and marketing of the crops would come to an almost complete standstill. Realizing how requisite minerals are at all times in our normal activities, it is readily evident that now with the safety and even the perpetuation of our country at stake the needed supplies of minerals have become indispensable for protecting the Nation and waging war successfully.

Obviously, specific answers to questions as to the kind and quantity of mineral commodities that Alaska contains require intensive examinations in the field of the various areas by geologists. These scientists through long and detailed training and experience in developed areas where like minerals occur have become skilled so that they can recognize and interpret those elusive features that furnish the bases from which dependable judgments can be drawn as to the worth of deposits that have not yet been developed. Before reaching their conclusions, however, the geologists must avail themselves of such office and laboratory tests as will check and make definite their field observations. This may call for extensive microscopic examinations of the specimens collected, assays, and chemical analyses of the carefully taken samples, library research and consultations with specialists, and recalculation and review of the mass of field notes and measurements that have been made. Finally, the explanation of the findings must be set down in carefully prepared written reports, which will hand on to others the significant results of the investigations and thus stimulate development of the deposits that appear to merit it or discourage wasting time and money on those that seem to have little present merit.

Necessarily, these mineral investigations are not limited and should not be restricted to the determination of the mere mineral content of the deposits examined, because many other geologic and topographic factors play important roles in determining whether or not a certain

deposit may be of value. To supply part of the information needed in the consideration of these broader aspects, the examinations include the making of topographic maps to show the situation of the area discussed with respect to all its natural surroundings. From these maps may be read the distances to all points within the area, the height of all land and water features both with respect to sea level and to each other, and relations to routes and means of communication and transportation. Indeed the uses of these maps are so diverse that they are relied on in all lines of governmental and private enterprise, whether or not even remotely concerned with mining. In other words, they are the authoritative maps of the land areas of the Territory and are in demand by road makers, aviation companies, settlers, travelers, industrialists, and specialists of all kinds concerned with Alaskan problems.

During recent years, with the menace of war looming ever more threateningly ahead and finally with the actual outbreak of war, the activities of the Alaskan Branch have become increasingly directed toward supplying information of most current significance. Thus its studies of minerals have been centered more and more closely on search for those that are urgently needed in the war industries. Tin, nickel, chrome, tungsten, antimony, and mercury are among those of which domestic supplies are not available in sufficient quantities to make all the needed tanks, airplanes, bombs, guns, and the myriad of other tools of war, and consequently are the materials for which most diligent search is being made by the Survey's Alaskan geologists. In part that work has been financed through appropriations made by Congress direct to the Geological Survey. In addition, recognition of the need of expediting that search has led the War Production Board to transfer certain of its funds to the Geological Survey, so that additional projects could be undertaken.

The need for more adequate and special maps of Alaska for military purposes, especially those used in aerial navigation, has become increasingly urgent. As a result, the Army Air Forces during the past year arranged to utilize extensively the services of the personnel of the Alaskan Branch in compiling maps of Alaska and other areas. The long and specialized experience gained by Alaskan topographers in quickly and economically mapping large tracts of country by either ground surveys or aerial photographic methods made the Air Forces' selection of this group an especially fitting choice. By this selection a nucleus of skilled engineers was readily at hand to start immediate production, to devise methods and instruments to facilitate the work, and to acquire and train the personnel needed to prepare whatever maps the Air Forces may call on the Geological Survey to compile. At the end of the fiscal year 1942 more than 150 persons were employed on this special work for the Air Forces, and requests on file from

the War Department indicated that the Survey should recruit two or three times that number as rapidly as practicable.

Owing to the strong seasonal control exercised by the weather and other conditions on the field projects undertaken by the Geological Survey in Alaska, description of the various undertakings cannot well be limited to a single fiscal or calendar year. A start on most of the projects is made in March or April, when plans are set in motion. The field work generally begins in May and continues through September, or as late as the weather permits, and is then followed by office and laboratory work during the following winter and spring. This condition is so fully recognized that the regular appropriations for investigations of Alaska mineral resources usually are not limited to a single fiscal year but become immediately available on the passage of the annual appropriation act and continue to be available throughout the next fiscal year. It is therefore convenient to refer the various projects undertaken by the Alaskan Branch to the "season" in which the field work was done. Thus the season of 1941 may have started in May 1941 and continued well into 1942, though part of the work up to June 30, 1941, may have been paid for from funds for the fiscal year 1941 and part prior to that date, and all subsequent to that date may have been paid for from funds for the fiscal year 1942.

Season of 1941.—During the season of 1941 the Alaskan Branch engaged in 17 projects which involved field work and 2 projects which, though based on field records, involved only office and laboratory work by members of its staff. Of the field projects 12 were primarily for the study of mineral resources, 4 were for topographic mapping, and 1 was for general administrative purposes and the planning of future work. Of the geologic or mineral resources projects 3 examinations related to chrome deposits, 2 to nickel, 2 to tin, 1 to mercury, and 1 to antimony. Two of the projects, 1 in southeastern Alaska and 1 in the Alaska Range, though directed toward general regional examination, included incidental preliminary studies of certain other deposits of antimony, tungsten, nickel, molybdenum, and iron. A general geological reconnaissance was made of the Porcupine River Valley in east-central Alaska.

The four topographic mapping projects involving field work were reconnaissance surveys in the Yentna district, aerial photography in the Yukon-Kuskokwim region, and detailed surveys in the Hot Springs district and at two localities in the vicinity of Tanana.

Although not involving field work by members of the Alaskan Branch, the compilation of aeronautical piloting maps from photographs furnished by the Army Air Forces and largely paid for from funds it transferred to the Survey became the principal office activity of the branch during the season of 1941 and is being continued at an accelerated rate and with a largely increased force. Another office

ask that is carried on uninterruptedly by the branch is the collection of statistics regarding the output of all mineral products from Alaskan deposits.

Season of 1942.—With the funds appropriated directly to the Geological Survey 14 field projects were gotten under way in the early part of the season of 1942. This number, however, was too small to permit undertaking all the examinations that were needed, and consequently in June the War Production Board made funds available to undertake 15 additional field projects. Although progress was made in recruiting personnel, getting equipment, and organizing these additional parties, none of them were actually in the field during the fiscal year 1942, and therefore these additional projects are not being described here further than to note that all of them related to the search for deposits of strategic and critical minerals. Of the original field projects 12 related directly to mineral resources and 2 primarily to topographic mapping. The 2 topographic projects that involved field work by the staff were reconnaissance surveys of parts of the Yukon and Kuskokwim Valleys that heretofore had not been adequately mapped. Both of these projects, besides contributing general information as to the parts of Alaska covered and being of special value in the compilation of military maps now in progress in the branch, were so planned as to fit into the Survey's regular program of mineral resources investigations that will be undertaken in the near future.

In addition to these projects involving field work in Alaska by members of its staff, the Alaskan Branch has continued in the office the compilation of maps needed by the Army Air Force for its series of aeronautical charts. This work is being carried on at a constantly accelerated rate, so that ultimately it will probably utilize the services of between 400 and 500 persons. It is therefore one of the largest activities of the branch at this time.

Reports and maps.—During the year 5 reports with maps and 1 report without maps, 3 new maps, reprints of 9 maps, and 8 press statements have been published; 10 reports containing maps and a reprint of 1 map are in course of publication; 9 reports and 1 new map are in course of preparation; and 2 reports prepared by the personnel of the Alaskan Branch were approved for outside publication.

Topographic Branch

The headquarters offices of the Topographic Branch and of its Atlantic Division are located at Washington; the headquarters office of the Pacific Division is at Sacramento, Calif.; and that of the Central Division at Rolla, Mo. Section offices were maintained at Denver, Colo., Chattanooga, Tenn., and Clarendon, Va.

General Office Work

Necessary office work incidental to the field work of the Topographic Branch consisted of the computation and adjustment of the results of control surveys, photoplanimetric compilation, and the inking, inspection, and editing of topographic maps prior to their submission for reproduction.

Section of Computing.—The volume of work connected with routine processes of computing, tabulating, and distributing the results of new control surveys was greatly increased during the year, because such surveys were accelerated in the field to meet the requirements of the large military mapping program. Activity was also intensified in reducing to current standard datum many older surveys, which could in this way be made useful to that program.

Manuscripts for three of the four parts of a bulletin that will contain the results of spirit leveling in Illinois were prepared and transmitted for publication. Bulletins 883-D and 883-E, Spirit leveling in Texas, the fourth and fifth of seven parts, were published during the year.

Section of Photomapping.—In addition to the Washington office this section maintains offices in Chattanooga, Tenn., and Clarendon, Va. Photomapping was also carried on in Rolla, Mo., and in Sacramento, Calif., under the immediate direction of the engineers in charge of the Central and Pacific Divisions.

Work in the Washington office consisted principally of the preparation of planimetric maps for use in the Central Division, the preparation of contracts for aerial photography, and the purchase of photographs from other agencies or companies. Thirty-two Geological Survey employees in the Chattanooga, Tenn., office were engaged in the preparation of planimetric and topographic maps of the Tennessee River Basin and of the State of New York, the latter being a project in which the War Department and the Tennessee Valley Authority are cooperating with the Geological Survey. Under this cooperation 834 square miles of topography were mapped in the State of New York.

The Clarendon, Va., office, which was established during this fiscal year, was engaged in the preparation of planimetric bases for topography and topographic maps of considerable areas in the Atlantic Division. Several special maps of areas in Western States were made for the Geologic Branch for use in studies of strategic and critical minerals. All work in the Clarendon and Chattanooga offices was done with either multiplex or aerocartograph photogrammetric instruments, but radial line methods only were employed in the Washington office.

Section of Cartography.—Work on the United States part of the map of the world on the scale of 1:1,000,000 was continued. Sheet N K-16,

Chicago, was lettered, edited, and transmitted for publication. The compilation and inking of sheets N K-17, Lake Erie, and N I-18, Hatteras, were in progress.

For the Public Roads Administration the preparation of the Transportation Map of the United States was continued. Compilation, inking, and lettering were in progress on 56 sheets. Proofreading and checking were completed on 24 sheets. Maps of 2 States, comprising 24 sheets, were published, and maps of 1 State, comprising 12 sheets, were in course of publication. Miscellaneous jobs were done for the War Department during the year.

Section of Inspection and Editing.—During the year 15 new topographic maps were prepared for photolithography as two-color advance sheets and 55 as planimetric maps; 186 new topographic maps were edited for publication, 104 of which were for multicolor lithography and 82 for engraving; 195 quadrangle maps, 4 State maps, and 3 State index maps were prepared and edited for reprint editions and corrections; and 29 maps were edited before furnishing prints for reproduction by outside contractors. Editing was also completed on 205 maps published as illustrations, making a total of 622 maps edited. Four hundred and ninety-three proofs of all types were read. On June 30, maps in the process of reproduction included 122 for engraving, 77 for multicolor lithography, and 26 planimetric maps. Maps being edited or awaiting editing included 80 maps for engraving and 129 for multicolor lithography. In Clarendon, Va., a drafting force was maintained for the drafting of Atlantic Division maps.

Map Information Office

The Map Information Office continued its work as an intradepartmental clearing agency for map and aerial photographic data pertaining to both Federal and commercial agencies. This office maintains extensive card index and map files and is equipped to furnish data to Federal and State institutions and to an interested public.

Field Surveys

Work was carried on in 38 States, in the District of Columbia, and in Puerto Rico. Cooperative projects were conducted in 17 of these States, in Puerto Rico, and with the Tennessee Valley Authority. Ninety-nine 15-minute and 133 7½-minute quadrangles were completed, and work was in progress on 72 15-minute and 84 7½-minute quadrangles. Of the completed quadrangles, 86 were mapped for the United States Army, and of those in progress 64 were for the same organization. Surveys of two special depots were completed for the Navy Department. Work on 7 special maps for the geologic

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Topographic mapping by the Geological Survey in the United States, Puerto Rico, and Hawaii, to June 30, 1942

State	Area mapped during fiscal year 1942 for publication on standard scales, contour intervals from 5 to 50 feet				Total area mapped to June 30, 1942	Total area of State mapped to June 30, 1942	Control, fiscal year 1942		
	Field scale		New survey	Resurvey			Spirit levels	Transit traverse	Triangulation stations established
	1 to 24,000 or larger	1 to 48,000							
	Square miles	Square miles	Square miles	Square miles	Square miles	Per cent	Miles	Miles	
Alabama	.....	1, 107	1, 107	.....	25, 209	48.8	592	643	.....
Arizona	.....	1, 202	1, 202	.....	32, 478	28.5	119	.....	.....
Arkansas	132	.....	.....	132	24, 367	45.9	154	111	.....
California	67	3, 255	1, 097	2, 225	130, 446	82.2	1, 012	123	53
Colorado	106	468	468	106	58, 156	55.8	280	201	31
Connecticut	139	.....	.....	139	5, 069	100.0	305	165	.....
Delaware	.....	.....	.....	.....	2, 057	100.0	.....	.....	.....
District of Columbia	.....	.....	.....	.....	69	100.0	.....	.....	.....
Florida	.....	529	529	.....	8, 457	14.4	669	660	.....
Georgia	1 491	.....	.....	491	25, 202	42.8	.....	.....	.....
Idaho	(1)	.....	.....	.....	37, 272	44.6	911	.....	11
Illinois	.....	855	855	.....	43, 576	77.3	33	.....	.....
Indiana	579	.....	579	.....	7, 016	19.3	575	641	.....
Iowa	.....	79	79	.....	14, 233	25.3	.....	.....	.....
Kansas	37	1 424	237	224	65, 852	80.0	487	897	18
Kentucky	.....	.....	.....	.....	27, 559	68.2	.....	.....	.....
Louisiana	(1)	2, 921	2, 921	.....	14, 567	30.0	1, 449	162	.....
Maine	.....	3, 688	1, 060	2, 628	25, 764	77.6	.....	18	.....
Maryland	.....	.....	.....	.....	10, 577	100.0	.....	.....	.....
Massachusetts	741	.....	.....	741	8, 257	100.0	234	336	.....
Michigan	280	.....	18	262	15, 821	27.2	122	141	.....
Minnesota	.....	.....	.....	.....	9, 542	11.4	.....	.....	.....
Mississippi	.....	314	314	.....	8, 997	18.9	.....	39	.....
Missouri	47	1, 398	904	541	58, 915	84.6	75	73	.....
Montana	.....	583	583	.....	38, 828	26.4	88	.....	.....
Nebraska	.....	.....	.....	.....	28, 225	36.5	.....	.....	.....
Nevada	15	.....	7	8	43, 543	39.4	.....	.....	.....
New Hampshire	.....	.....	.....	.....	9, 304	100.0	.....	.....	.....
New Jersey	.....	.....	.....	.....	7, 836	100.0	.....	.....	.....
New Mexico	.....	.....	.....	.....	35, 652	29.3	198	.....	12
New York	121	138	.....	259	49, 576	100.0	430	1, 034	.....
North Carolina	1, 616	.....	.....	1, 616	19, 574	37.1	.....	.....	.....
North Dakota	52	198	244	6	16, 115	22.8	50	.....	36
Ohio	.....	.....	.....	.....	41, 222	100.0	.....	.....	.....
Oklahoma	.....	.....	.....	.....	41, 342	59.1	.....	80	.....
Oregon	.....	246	212	34	34, 601	35.7	167	.....	20
Pennsylvania	.....	329	329	.....	42, 081	92.8	308	161	.....
Rhode Island	332	.....	.....	332	1, 214	100.0	551	338	.....
South Carolina	152	.....	.....	152	15, 772	50.8	.....	.....	.....
South Dakota	.....	.....	.....	.....	20, 750	26.9	.....	.....	.....
Tennessee	1, 433	.....	.....	1, 433	23, 998	56.8	.....	.....	.....
Texas	.....	572	572	.....	92, 018	34.4	197	345	.....
Utah	4	135	135	4	20, 119	23.7	49	.....	.....
Vermont	.....	26	26	.....	9, 176	95.5	15	369	.....
Virginia	30	189	.....	219	38, 097	93.3	.....	333	.....
Washington	.....	1, 128	326	802	43, 507	63.8	888	84	67
West Virginia	.....	.....	.....	.....	24, 181	100.0	.....	.....	.....
Wisconsin	.....	(1)	.....	.....	20, 273	36.1	.....	633	20
Wyoming	.....	.....	.....	.....	35, 322	36.1	.....	.....	.....
Total	6, 374	19, 784	13, 804	12, 354	1, 411, 724	46.7	9, 997	7, 587	268
Hawaii	.....	.....	.....	.....	6, 435	100.0	.....	.....	.....
Puerto Rico	24	.....	4	.....	1, 013	29.5	57	.....	49

¹ Planimetric maps, not included in total surveys, were compiled from aerial photographs with field examination—Georgia, 140; Idaho, 62; Kansas, 341; Louisiana, 563; and Wisconsin, 2,106.

² Contour interval in meters.

investigation of strategic minerals was completed and work on 2 continued. The survey of the Dinosaur National Monument, Colorado-Utah, was completed. Twenty-seven 7½-minute and twenty-two 15-minute planimetric maps were also completed. Revision of the map of Washington and vicinity was 99 percent completed.

Of the total area of the United States, 46.7 percent has been covered by topographic maps prepared by the Geological Survey.

Water Resources Branch

The Geological Survey collects and publishes data on the quantity, chemical quality, and availability of the water resources of the United States. These data are prerequisite to the location and operation of military establishments and war industries and to the orderly and efficient development of domestic, municipal, and industrial water supplies. They are also essential for assuring the success of irrigation, power, navigation, flood-protection, and pollution-control works.

Funds aggregating nearly \$3,000,000 were available for water-resources investigations during the fiscal year 1942. Of that amount, about 40 percent was appropriated by Congress, about 35 percent was contributed by States and municipalities, and about 25 percent was transferred or reimbursed by other Federal agencies.

Cooperation With States and Municipalities

The appropriation by Congress for water work during the fiscal year 1942 was \$1,285,500. Of that appropriation, \$1,000,000 was restricted for use in cooperation with States and municipalities, and these cooperative agencies contributed essentially the same amount, as summarized below.

State	Contri- bution	State	Contri- bution	State	Contri- bution
Alabama.....	\$10,000	Maryland.....	\$7,925	Oklahoma.....	\$18,812
Arizona.....	24,900	Massachusetts.....	14,104	Oregon.....	25,475
Arkansas.....	10,500	Michigan.....	14,250	Pennsylvania.....	30,725
California.....	81,050	Minnesota.....	12,023	Rhode Island.....	1,750
Colorado.....	34,000	Mississippi.....	15,000	South Carolina.....	5,500
Connecticut.....	9,350	Missouri.....	11,000	South Dakota.....	400
Florida.....	42,150	Montana.....	20,335	Tennessee.....	10,150
Georgia.....	15,000	Nebraska.....	26,000	Texas.....	73,704
Idaho.....	24,300	Nevada.....	1,500	Utah.....	23,000
Illinois.....	15,268	New Hampshire.....	11,250	Vermont.....	4,700
Indiana.....	11,024	New Jersey.....	25,100	Virginia.....	22,458
Iowa.....	22,347	New Mexico.....	42,200	Washington.....	33,680
Kansas.....	40,000	New York.....	70,847	West Virginia.....	7,500
Kentucky.....	10,500	North Carolina.....	18,570	Wisconsin.....	8,175
Louisiana.....	15,415	North Dakota.....	5,750	Wyoming.....	15,775
Maine.....	7,500	Ohio.....	18,560	Hawaii.....	37,352

Activities Carried on for Other Federal Agencies

Other Federal agencies have provided about \$670,000 for water-resources investigations that could not be financed by appropriated funds of the Survey or included in cooperative projects. These agencies are: Office of the Chief of Engineers, Office of the Quartermaster General, and the Mississippi River Commission, War Department; Bureau of Yards and Docks and Coast Guard, Navy Department; Bureau of Prisons, Department of Justice; Tennessee Valley Authority; Flood Control Coordinating Committee, Department of Agriculture; Weather Bureau, Department of Commerce; Bureau of Reclamation, Fish and Wildlife Service, Grazing Service, National Park Service, Office of Indian Affairs, and Office of Land Utilization, Department of the Interior; Department of State; Federal Power Commission; and National Resources Planning Board.

Review of the Year's Accomplishments

The Geological Survey's operations related to water are grouped under five administrative divisions of the Water Resources Branch: Surface water, ground water, quality of water, utilization of water, and power resources.

Records of the stages, quantity, or availability of surface waters are collected at about 5,000 gaging stations, of which nearly 3,800 are equipped with water-stage recorders, distributed through every State and the Territory of Hawaii—sparsely in some States and increasing in number as the cooperative funds increase. The field records are analyzed, studied, and published. They become the basis for development projects and for the control and distribution of water for municipal, industrial, and irrigation uses and for the protection of health, the operation of inland waterways, and similar activities.

Surface-water investigations were conducted in cooperation with 140 State and municipal agencies. The field personnel for this work operates from 45 principal field offices. The program of construction, operation, and maintenance of gaging stations in connection with the flood-control investigations and maintenance and improvement of river and harbor works of the Corps of Engineers, War Department, was continued. Cooperative stream-flow investigations in connection with irrigation systems, land-use studies, water-power developments, and other activities were continued with other Federal agencies.

The studies of ground water relate to the waters that lie within the zone of saturation, from which wells and springs are supplied; the source, occurrence, quantity, and head of these waters; their conservation and natural and artificial replenishment; their availability and adequacy for domestic, industrial, irrigation, and public supplies

and as sources of water for livestock and desert travelers; and methods of constructing wells and recovering water from them and of improving springs. The increasing use of water from wells is causing a great demand for intensive studies of the quantities of ground water that are perennially available.

Ground-water work, conducted through 25 field offices, was done in nearly every State. In 32 States and in Hawaii it was accomplished in cooperation with the State Geological Surveys or other State and municipal agencies. Periodic measurements of water levels or artesian pressures were made in about 7,100 observation wells, 312 of which were equipped with recording gages.

Chemical analyses of 2,201 samples of water were made in Washington, and analyses of 7,114 samples were made in field laboratories. Studies were continued on the chemical character of surface waters in cooperation with four States, and analyses of water were made in connection with cooperative studies of ground water in other States.

In addition to work for war agencies, interpretations of analyses or advice about water problems were furnished for 17 bureaus in 6 Federal departments and for 7 independent Government agencies.

A variety of hydrologic and hydraulic studies and compilations are made on the utilization and control of streams, and a monthly summary is issued of stream-flow conditions throughout the country as indicated by reports received from the field engineers. These summaries are used by major war agencies in administering production in which water excesses, as in floods, or shortages, as in droughts, are vital. The administration of certain responsibilities relating to permits and licenses of the Federal Power Commission has been continued. Because of the importance of power in the war program this function is increasingly essential. Investigations of water problems along the international boundary between the United States and Canada have been continued for the State Department and the International Joint Commission. Among the important problems studied have been the international aspects of storage above the Grand Coulee Dam and in Kootenai Lake, both of which have great importance in the production of power for war.

With the aid of various Federal agencies a report, by countries, of the amount of developed and potential water power of the world has been compiled and published. This report showed that the total potential water power, based on ordinary minimum flow, was 672,000,000 horsepower and that the total capacity of water-power plants of the world was 71,600,000 horsepower on January 1, 1942. Of the developed power, about 27 percent is in the United States, 12 percent in Canada, 9 percent each in Italy and Japan, and lesser amounts in other countries.

War Service

Reports and consulting services have been furnished on the quantity and quality of both surface- and ground-water supplies for war purposes at about 1,700 places in the United States and in certain islands of strategic importance, as requested by the War and Navy Departments, the War Production Board, and other war agencies. These reports and services were made available in part on the basis of information collected in previous years and in part on the results of special investigations made in regions where such information was meager or the possible deficiencies in quantity or the doubtful quality of water appeared to be most threatening. Trained personnel stationed at 75 field offices throughout the country were utilized for such special field investigations, which related to the water supplies for Army cantonments, naval stations, munitions plants, largely increased local concentrations of population producing war supplies, and for other war activities. Because of the danger of local depletions of ground water by heavy pumping for war purposes, regional surveys were undertaken to determine total pumpage, water-level fluctuations, and possible salt-water encroachment in critical areas. Surveys were also made for the Navy Department of emergency supplies from wells in case of attack.

Day-by-day records of water are essential not only to the social and economic development of the Nation but also to the development and operation of the war program. Private and public power developments, such as the Bonneville, Boulder, and Tennessee Valley Authority systems, are furnished with basic data on available water supplies required currently for operation of the plants and for planning the expansions that may be made necessary by the rapidly increasing demand for electric power.

Summaries of water conditions, both on the surface and underground, throughout the United States were prepared each month for the use of the agencies in charge of water-supply and power activities related to the war. Collaboration with the Dominion Water and Power Bureau of Canada enables both the United States and Canada to benefit from a knowledge of conditions brought up to date each month. The Water Resources Branch has furnished information on water supplies in many foreign countries to the War and Navy Departments. It also has furnished information on present and potential power resources requested by those Federal and allied agencies directly concerned with power production.

The Water Resources Branch through the facilities of its Nation-wide distribution of personnel served the War Production Board by making a survey of the use of pig iron at about 2,400 foundries.

Thus, the reservoir of information contained in the published and

unpublished records related to the water resources of the Nation, the facilities and information made available by cooperation with many States and municipalities, and the asset represented by hundreds of engineers, geologists, and chemists experienced in work on water have been made of maximum value in the war.

Conservation Branch

The normal work of the Conservation Branch consists of the making of surveys and investigations of the water and mineral resources of the public domain; the supervision of operations incident to the development of power and the production of minerals from public lands, Indian lands, and naval petroleum reserves; and the furnishing of technical decisions and information to Government agencies engaged in administering the public-land laws. In time of war these continuing functions of government undergo little change in basic character but are materially intensified and accelerated by the necessity of meeting the imperative need of the Nation for increased supplies of power and raw materials. At such time the whereabouts, worth, and accessibility of the mineral and water-power resources under Federal control—questions answered by adequate land classification—become overnight matters of grave national concern; and the competent prospecting and efficient development of Government-controlled sources of mineral fuels, metals, fertilizers, and industrial chemicals—the result of adequate mineral-lease supervision—become vital elements of national survival.

Since December 7, 1941, both of these primary phases of Conservation Branch work—land classification and mineral-lease supervision—have been intensified and, wherever possible, so redirected as to lend increased support to the national objectives of winning the war and of perpetuating the best in the American way of life.

Classification of Lands

Mineral classification.—As consultant in geology to Federal agencies, primarily bureaus and offices of the Interior Department charged with the administration of laws governing Federal and Indian lands, the Mineral Classification Division continued in 1942 its indispensable work of supplying the geologic findings and decisions that are prerequisite to the grant or transfer of prospecting and development rights in such lands under the mineral-leasing laws, to the approval of unitization agreements for oil and gas holdings and of participating areas thereunder, to the occupancy of such lands for right-of-way purposes, and to the outright disposal of such lands under the nonmineral land laws. In all, 7,355 cases involving from 1 to 50 geologic decisions

each were acted on during the year. Additional office work included the preparation and promulgation of definitions or redefinitions of the known geologic structure of 17 producing oil and gas fields, the net area so defined in nine public-land States being increased to 1,686,950 acres at the end of the fiscal year.

In aid of mineral classification geologic surveys were made of coal, petroleum, and potash occurrences in Wyoming, Kansas, and New Mexico and of geologic conditions at one dam site in Washington.

Water and power classification.—The work of obtaining basic information concerning the water-power resources and storage possibilities of Federal lands and of making such information available for use in the administration of the public-land laws was continued throughout 1942. Office activity resulted in the addition of 19,618 acres to power-site reserves and the elimination of 22,720 acres therefrom, with net reduction of the outstanding reserves in 22 States and Alaska to 6,615,746 acres; in the publication in mimeographed form of 6 preliminary reports on stream utilization; and in final action involving hydraulic determinations on 228 cases received for report from departmental sources and the Federal Power Commission. Reservoir-site reserves in 9 States remained unchanged, at 137,172 acres.

In the field, topographic surveys were made of 68 linear miles of stream valley, of 9 dam sites, and of 1 mineral leasehold, and, in cooperation with the Water Resources Branch, supervision of construction and operation was given to 160 power projects under license from the Federal Power Commission and to 136 such projects under permit or grant from the Department of the Interior. For want of funds the division office at Sacramento, Calif., was discontinued during the year.

Mineral Lease Supervision

Mine supervision.—Through the Mining Division, inspectional, regulatory, and accountancy supervision is exercised over operations for the discovery and production of coal, potassium, sodium, phosphate, oil shale, and sulfur in public lands; of gold, silver, and mercury in certain land grants; and of all metalliferous and nonmetalliferous minerals except oil and gas in tribal and restricted-allotted Indian lands. The work is done from seven field offices in the West and Southwest, and on June 30, 1942, it involved 696 public-land properties under lease, license, and prospecting permit in 15 States and Alaska and 313 Indian properties under lease and permit in 14 States.

In the field of mine supervision the effects of war on industrial activity throughout the country, on transportation, and on the fuel-consuming habits of the American people were beginning to be ap-

arent before the end of the fiscal year 1942. The production of coal, potassium salts, and phosphate rock from public lands in 1942 was substantially greater than in 1941, and the accrued revenues were correspondingly increased. Additional properties were coming to production at the end of the fiscal year, and an unusual amount of prospecting was under way on public lands, particularly for coking coal suitable for metallurgical uses, for magnesium-rich brines, and for vanadium-rich phosphate rock.

On Indian lands, mining activity was responsive to the same economic forces and resulted during the year in a large increase in the production of lead and zinc, in a substantial increase in the production of coal, and in extensive prospecting of such lands with a view to the early development of deposits of vanadium, tungsten, magnesium, copper, and chromium known to occur therein.

Information and assistance on war-engendered problems involving the occurrence of coal and of numerous other minerals, both metalliferous and nonmetalliferous, in various parts of the United States and its possessions were provided by the engineers of the division both in Washington and in the field to numerous individuals contemplating development and to representatives of many State and Federal agencies.

Oil and gas supervision.—Through the Oil- and Gas-leasing Division supervision analogous to that of the Mining Division is exercised over operations for the discovery and production of petroleum, natural gas, natural gasoline, and butane occurring in public lands of the United States, in naval petroleum reserves, and in all Indian lands subject to departmental jurisdiction, both tribal and allotted, except those of the Osage Nation, Oklahoma. During the fiscal year 1942 the inspectional, regulatory, and accountancy duties of supervision were discharged through 16 field offices and suboffices in California, New Mexico, Oklahoma, Colorado, Wyoming, Montana, and Utah.

Because of the vital importance of petroleum, its fluid associates, and its derivatives to industry, transportation, and all phases of warfare, the transition of the Nation from a defense basis to an all-out war basis during the year increased vastly the duties and responsibilities of oil and gas leasehold supervision. Necessary and far-reaching controls imposed by the Government on oil and gas production and particularly on the multifarious uses of steel throughout the petroleum industry entailed extensive revisions and modifications of drilling programs affecting leaseholds under the jurisdiction of the division, increased vigilance in safeguarding the conservational and pecuniary interests of the lessors involved, and caused unprecedented use of the informational and consultive facilities of the division by lessees, operators, State agencies, and Federal officials.

On public lands the number of properties under supervision at the

end of the fiscal year aggregated 4,465 and involved 3,513,125 acres in 20 States and Alaska. Drilling on such lands during the year included the spudding of 414 wells and the completion of 460 wells, 346 of which were productive of oil or gas and 114 of which were barren. In all, 10,154 public land wells, including 5,327 capable of oil and gas production, were under supervision on June 30, 1942. The production of petroleum, natural gas, natural gasoline, and butane from public lands in 1942 was substantially greater than in 1941.

During the year 5 new plans of unit operation involving public lands were approved and 5 were canceled, leaving 117 approved plans, involving 1,862,860 acres, outstanding on June 30, 1942. Production under approved unit agreements constituted about 45 percent of the petroleum, 55 percent of the natural gas, and 65 percent of the gasoline and butane obtained from public lands in the fiscal year.

On Indian lands the work of oil and gas lease supervision involved 4,281 leaseholds in 8 States containing, at the end of the year, a total of 7,875 wells, 4,176 of which were productive of oil or gas, and 213 of which had been completed during the year. Production from such leaseholds was substantially greater than in the preceding year, notably from Kiowa lands in Oklahoma, Blackfeet lands in Montana, and Shoshone lands in Wyoming, and revenues accrued therefrom as royalty, rental, and bonus are estimated to be in excess of \$2,600,000.

On behalf of the Navy Department supervision was continued in 1942 over operations for the production of oil, gas, gasoline, and butane from 22 properties under lease in Naval Petroleum Reserves Nos. 1 and 2 in California and for the conservation of shut-in production in Reserve No. 3 in Wyoming. Production from 294 active wells on Reserves Nos. 1 and 2 aggregated 2,753,877 barrels of petroleum, 1,931,786,000 cubic feet of natural gas, and 8,918,047 gallons of natural gasoline and butane, having an aggregate royalty value of \$633,603.64.

Public Works projects.—During the fiscal year 1942 expenditures of \$5,014.39 were made from funds allotted by the Public Works Administration in the plugging or conditioning, under the supervision of personnel of the Oil- and Gas-leasing Division, of wells for which no bonded liability for proper abandonment exists.

Work on Publications

Texts.—The book publications of the year numbered 69 in the regular series and 20 pamphlets and circulars for administrative use. The total number of pages was 7,295. Besides these printed publications 53 brief papers were issued in mimeographed form as memoranda for the press.

Illustrations.—The illustrations prepared consisted of 684 drawings and photographs. One thousand and fourteen illustrations to accompany 64 reports were transmitted to the printer, and 687 proofs and 57 edition prints were examined.

Geologic map editing and drafting.—Most of the 107 maps and illustrations prepared by the section were related directly to investigations of mineral deposits essential to the war effort. Some of these were intended for publication in reports of the Geological Survey; others were sent direct to the War Production Board or other war agencies. Work was continued on the reconnaissance map of southern New Mexico. Maps and illustrations for 64 reports were edited, and proofs of 60 geologic maps and sections for 29 reports were read.

Distribution.—A total of 742 publications, comprising 68 new books and pamphlets, 102 new or revised topographic and other maps, 1 geologic folio, 39 Tennessee Valley Authority maps with contours, 16 reprinted topographic and other maps, 184 new advance sheets, and 22 reprinted advance sheets were received during the year. The total units of all publications received numbered 125,670 books and pamphlets, 1,410,317 topographic and other maps, and 4,570 geologic folios, a grand total of 1,540,557. The division distributed 102,124 books and pamphlets, 1,972 geologic folios, and 1,490,140 maps, a grand total of 1,594,236, of which 1,570 folios and 1,352,823 maps were sold. The net proceeds (gross collections less copying fees and amounts refunded) from the sales of publications were \$37,200.64, including \$36,842.92 for topographic and geologic maps and \$357.72 for geologic folios. In addition to this, \$52,686.52 was repaid by other agencies of the Federal Government at whose request maps or folios were furnished. The total net receipts, therefore, were \$89,887.16.

Engraving and printing.—During the year 13 special maps and 89 newly engraved topographic maps, 6 of which were revised maps, were printed, making a total of 102 new maps printed and delivered. Reprint editions of 309 engraved topographic maps and 17 photolithographed State and other maps were printed and delivered. Of new and reprinted maps, 428 different editions, amounting to 1,149,557 copies, were delivered. One geologic folio amounting to 4,570 copies was delivered. Printed small sale editions of 57 planimetric, 17 advance photolithographed, and 126 multicolor photolithographed topographic maps, totaling 247,155 copies, were printed from plates previously made for official purposes. A large amount of work was done for 80 other units of the Government, including branches of the Geological Survey, and the charges for it amounted to about \$220,000, for which the appropriation for engraving and printing geologic and topographic maps was reimbursed. Transfer impressions and velox

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Distribution.—A total of 742 publications, comprising 68 new books and pamphlets, 102 new or revised topographic and other maps, 39 geologic folio, 39 Tennessee Valley Authority maps with contours, 26 reprinted topographic and other maps, 184 new advance sheets, and 22 reprinted advance sheets were received during the year. The total units of all publications received numbered 125,670 books and pamphlets, 1,410,317 topographic and other maps, and 4,570 geologic folios, a grand total of 1,540,557. The division distributed 102,124 books and pamphlets, 1,972 geologic folios, and 1,490,140 maps, a grand total of 1,594,236, of which 1,570 folios and 1,352,823 maps were sold. The net proceeds (gross collections less copying fees and amounts refunded) from the sales of publications were \$37,200.64, including \$36,842.92 for topographic and geologic maps and \$357.72 for geologic folios. In addition to this, \$52,686.52 was repaid by other agencies of the Federal Government at whose request maps or folios were furnished. The total net receipts, therefore, were \$89,887.16.

Engraving and printing.—During the year 13 special maps and 89 newly engraved topographic maps, 6 of which were revised maps, were printed, making a total of 102 new maps printed and delivered. Reprint editions of 309 engraved topographic maps and 17 photolithographed State and other maps were printed and delivered. Of new and reprinted maps, 428 different editions, amounting to 1,149,957 copies, were delivered. One geologic folio amounting to 4,570 copies was delivered. Printed small sale editions of 57 planimetric, 17 advance photolithographed, and 126 multicolor photolithographed topographic maps, totaling 247,155 copies, were printed from plates previously made for official purposes. A large amount of work was done for 80 other units of the Government, including branches of the Geological Survey, and the charges for it amounted to about \$220,000, for which the appropriation for engraving and printing geologic and topographic maps was reimbursed. Transfer impressions and velox

end of the fiscal year aggregated 4,465 and involved 3,513,125 acres in 20 States and Alaska. Drilling on such lands during the year included the spudding of 414 wells and the completion of 460 wells, 346 of which were productive of oil or gas and 114 of which were barren. In all, 10,154 public land wells, including 5,327 capable of oil and gas production, were under supervision on June 30, 1942. The production of petroleum, natural gas, natural gasoline, and butane from public lands in 1942 was substantially greater than in 1941.

During the year 5 new plans of unit operation involving public lands were approved and 5 were canceled, leaving 117 approved plans involving 1,862,860 acres, outstanding on June 30, 1942. Production under approved unit agreements constituted about 45 percent of the petroleum, 55 percent of the natural gas, and 65 percent of the gasoline and butane obtained from public lands in the fiscal year.

On Indian lands the work of oil and gas lease supervision involved 4,281 leaseholds in 8 States containing, at the end of the year, a total of 7,875 wells, 4,176 of which were productive of oil or gas, and 21 of which had been completed during the year. Production from such leaseholds was substantially greater than in the preceding year, notably from Kiowa lands in Oklahoma, Blackfeet lands in Montana, and Shoshone lands in Wyoming, and revenues accrued therefrom. Royalty, rental, and bonus are estimated to be in excess of \$2,600,000.

On behalf of the Navy Department supervision was continued in 1942 over operations for the production of oil, gas, gasoline, and butane from 22 properties under lease in Naval Petroleum Reserves Nos. 1 and 2 in California and for the conservation of shut-in production in Reserve No. 3 in Wyoming. Production from 294 active wells on Reserves Nos. 1 and 2 aggregated 2,753,877 barrels of petroleum, 1,931,786,000 cubic feet of natural gas, and 8,918,047 gallons of natural gasoline and butane, having an aggregate royalty value of \$633,603.64.

Public Works projects.—During the fiscal year 1942 expenditures of \$5,014.39 were made from funds allotted by the Public Works Administration in the plugging or conditioning, under the supervision of personnel of the Oil- and Gas-leasing Division, of wells for which no bonded liability for proper abandonment exists.

Work on Publications

Texts.—The book publications of the year numbered 69 in the regular series and 20 pamphlets and circulars for administrative use. The total number of pages was 7,295. Besides these printed publications 53 brief papers were issued in mimeographed form as memoranda for the press.

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prints, numbering 276, were made during the year, and the amount turned over to miscellaneous receipts was \$547.86. Topographic maps and contract and miscellaneous work of all kinds, totaling 2,623,379 copies, were printed and delivered. The photographic laboratory made 10,517 negatives, 27,435 prints, and 3,075 photolith press plates, 285 intaglio etchings, and 8 celluloid transfers, and mounted 218 prints.

Library

In the work being done for the armed forces the library is rendering essential service, not only to its own bureau but also to the War and Navy Departments and to the various planning and production agencies, both by loans of material and by service to research workers. Because of war conditions the new material received has decreased, the number of books and pamphlets received during the year being only 12,735. The number of readers jumped to 11,291, an increase of nearly 4,000 over the previous year. Nearly 56,000 pieces of material were circulated, an increase of more than 50 percent within the Survey and 80 percent in interlibrary loans.

Field Equipment

The Division of Field Equipment designs, constructs, and repairs instruments used by the several branches of the Geological Survey in their war activities, in addition to its work as custodian of the various surveying, geologic, meteorologic, and hydrologic instruments used in the field by those branches. The Division's greatest contribution toward winning the war lay in the assistance given to the Alaskan Branch in the design and construction of numerous mechanical devices that have greatly accelerated the production of maps in connection with the mapping program for the Air Corps. The most important of those devices are the Lewis rectoblique plotter, the Sketchmaster, and the Lucidagraph. Development work is in progress on several new devices, such as a double photoalidade and a stereoblique plotter. By means of instruments of this type, aerial photographs taken at an angle of approximately 30° below the horizon may be converted to maps such as are required for the navigation of air forces over previously unmapped or inadequately mapped areas. The reconditioning of between 50 and 100 outmoded plane-table alidades for field use by the Topographic Branch in mapping strategic areas is another outstanding contribution of the division. These alidades, although practically discarded during previous years because of newer improvements, proved to be a valuable resource when the manufacturers of such instruments became so busy on War and Navy contracts that deliveries on new equipment became long-delayed or impossible to obtain.

Funds

During the fiscal year 1942 there was available for expenditure under the direction of the Geological Survey a total of \$9,362,809. Of this amount, \$4,997,880 was appropriated directly to the Geological Survey, and \$4,364,929 was made available by other Federal agencies and by States and their political subdivisions. In addition, \$9,800 was allotted from the appropriation for contingent expenses of the Department of the Interior for miscellaneous supplies.

Funds available to the Geological Survey in 1942 from all sources

General administrative salaries, Interior Department Appropriation Act.....		\$187, 000
Topographic surveys:		
Interior Department Appropriation Act.....	\$1, 962, 500	
States, counties, and municipalities.....	340, 605	
War Department.....	1, 046, 070	
Tennessee Valley Authority.....	53, 000	
Public Roads Administration.....	33, 815	
Public Works Administration.....	37	
Miscellaneous repay.....	51, 606	
		3, 487, 633
Geologic Surveys:		
Interior Department Appropriation Act.....	500, 000	
Third Supplemental National Defense Appropriation Act.....	1, 440	
States, counties, and municipalities.....	45, 117	
Bureau of Mines.....	80, 000	
National Defense allotment (Office of the President).....	30, 000	
Miscellaneous repay.....	6, 410	
		662, 967
Strategic and critical minerals:		
Interior Department Appropriation Act.....	195, 000	
Second Supplemental National Defense Appropriation Act.....	50, 000	
State Department (for work in other American Republics).....	50, 000	
		295, 000
Mineral Resources of Alaska:		
Interior Department Appropriation Act.....	75, 000	
Third Supplemental National Defense Appropriation Act.....	540	
War Department.....	124, 842	
Office for Emergency Management.....	164, 642	
		365, 024
Gaging Streams:		
Interior Department Appropriation Act.....	1, 274, 500	
Third Supplemental National Defense Appropriation Act.....	11, 000	
States, counties, and municipalities.....	1, 038, 320	

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Funds available to the Geological Survey in 1942 from all sources—Continued

Gaging Streams—Continued.

Permittees and licensees of Federal Power Commission.....	\$19, 556	
Department of the Interior:		
Bureau of Reclamation.....	3, 485	
Fish and Wildlife Service.....	3, 838	
Office of Indian Affairs.....	23, 468	
National Park Service.....	350	
Bonneville Power Administration.....	224	
Department of Agriculture.....	45, 477	
Commerce Department.....	448	
Federal Power Commission.....	264	
Federal Works Agency.....	1, 064	
Department of Justice.....	792	
National Youth Administration.....	60	
Navy Department.....	2, 508	
State Department.....	58, 600	
Treasury Department.....	928	
Tennessee Valley Authority.....	55, 000	
War Department:		
Office of Chief of Engineers.....	658, 659	
Mississippi River Commission.....	4, 670	
Quartermaster Construction Division.....	680	
War Production Board.....	47, 440	
National Resources Planning Board.....	939	
		\$3, 252, 270
Classification of lands:		
Interior Department Appropriation Act.....	105, 000	
Miscellaneous repay.....	400	
		105, 400
Printing and binding, Interior Department Appropriation Act.....		125, 000
Preparation of illustrations, Interior Department Appropriation Act.....		25, 000
Engraving and printing geologic and topographic maps:		
Interior Department Appropriation Act.....	159, 900	
Third Supplemental National Defense Appropriation Act.....	3, 000	
Miscellaneous repay.....	220, 000	
		382, 900
Mineral leasing:		
Interior Department Appropriation Act.....	317, 000	
Third Supplemental National Defense Appropriation Act.....	6, 000	
Navy Department.....	45, 000	
Office of Indian Affairs.....	100, 000	
Public Works Administration.....	5, 297	
Miscellaneous repay.....	56	
		473, 353
Payment from proceeds of sale of water, special account.....		1, 262
Total.....		9, 362, 809

Bureau of Mines

R. R. SAYERS, Director

Foreword

GUIDED by more than three decades of experience in the conservation and development of mineral resources, the Bureau of Mines quickly and efficiently completed the conversion of its activities to the national-defense program by the beginning of the 1942 fiscal year, and when hostilities began in December 1941, the Bureau adjusted all its widespread operations to a full war basis.

Many valuable contributions to the war program were recorded by the Bureau of Mines during the fiscal year. Engineers and technologists explored domestic mineral deposits throughout the United States and in Alaska, and revealed several hitherto unknown reserves of strategic, critical, and essential ores; metallurgists presented the country with new and improved methods for beneficiating low-grade domestic ores and thus developed additional means for obtaining some of the metals vitally needed for guns, ships, planes, and tanks; petroleum and gas engineers increased by many times the output of helium at the Government-owned plant; solid-fuels chemists developed further the knowledge of domestic coking coals; health and safety experts concentrated on conserving skilled manpower for war industries; and mineral economists and statisticians collected and interpreted data on the production, consumption, and uses of minerals and helped guide the Federal war agencies and private war industries in essential planning for prosecution of the war.

Former dependence upon imports for many critical and strategic minerals and the necessity for a quicker change to utilization of the domestic low-grade ores, which was created partly by American shipping losses, brought the exploratory and metallurgical work of the Bureau into sharp focus during the 1942 fiscal year. The Bureau's mining engineers made known important additional reserves of chromite, manganese, mercury, tungsten, iron ore, bauxite, and alumina clay. As a result of this work, the estimated reserves of chromite alone were increased about 2,300,000 tons, and production was begun in three areas; there were two important discoveries of high-

grade mercury and five significant findings of tungsten; the reserves of manganese ore of milling grade were increased at least 1,100 tons; more than 1,000,000 tons of usable bauxite were found; drilling at five clay projects indicated 4,600,000 tons that contain 35 percent alumina. Altogether, 740 deposits of strategic ores were examined and rated as to relative importance.

To utilize to the fullest extent both the newly found ores and other known low-grade domestic deposits, the Bureau's metallurgists and chemists labored in the 1942 fiscal year to develop and perfect new treatment processes and to improve old ones. Laboratory investigations and pilot-plant tests showed that substantial amounts of manganese, chromium, magnesium, and aluminum could be made available. Methods also were developed for treating ores containing aluminum, cobalt, and magnesium, and laboratory work was continued on the beneficiation of ores containing antimony, copper, mercury, nickel, tungsten, zinc, and fluor spar. A number of suggestions for increasing domestic production were submitted to war-production agencies. Because of the importance of manganese in steel-making, considerable attention was given to developing vast low-grade reserves of this metal. Through its network of laboratories and pilot plants, the Bureau expanded and intensified its work in ore dressing, ore concentration, hydrometallurgy, electrometallurgy, and pyrometallurgy.

Proportionate attention was directed toward the development and use of many of the important nonmetals, such as graphite, kyanite, talc, glass sand, and forsterite. A shortage of flake graphite for crucible and steel-ladle stoppers was foreseen during the fall of 1941 and in consequence of the Bureau's experiments on graphite from domestic deposits, the War Production Board made arrangements to operate five mills. Substitutes were found for Indian kyanite. Sample talcs were tested to find ceramic talc suitable for radio insulators; some West coast sands were found to be usable, with treatment, as substitutes for imported glass sands; and deposits of volcanic rocks of a certain type were found to be good substitutes for magnesite bricks.

The Bureau's technologic work on solid fuels included the analysis and testing of coal samples from all parts of the United States; advising the Government in the purchase of coal; exploring for western coal deposits and testing these coals to find those suitable for use to be used in the steel industry of that region; making gasoline from coal; devising a new method of extinguishing magnesium incendiary fires in industrial plants; and treating and conditioning boiler water. More than 15,000 coal analyses were made. New blast furnaces in the West and a lack of coking coal led the Bureau to analyze numerous western coals; as a result, it was found that certain coals could meet needs for coking coal in the West.

In response to the increasing demand for high-octane gasoline to run the engines of the United Nations' fighting planes throughout the world, the Bureau examined the aviation-gasoline stock of 200 crude oils and the products of 25 condensate plants. It also made a series of tests on the blending of high-octane gasoline and studies of the available reserves. The Bureau opened a new petroleum field office at Franklin, Pa.

An outstanding accomplishment last year was the promptness with which the Bureau increased helium production at its plant in Texas to supply greatly increased demands for this lightweight, noninflammable gas to fill submarine-patrol dirigibles, Army blimps and balloons, meteorological balloons, and barrage balloons, and for other military and essential civilian uses. Helium production in 1942 was higher than at any time in the 13-year history of the Government plant, as output actually exceeded the rated plant capacity.

Explosives research and testing by the Bureau in the 1942 fiscal year resulted in an increased volume of work to meet the growing demands of the mining industry, which normally uses more than two-thirds of all the industrial explosives manufactured in the United States. The Bureau made numerous chemical analyses, gallery tests, and control tests of a physical nature in the program of retaining safe characteristics of permissible mining explosives and also cooperated with the Ordnance Department of the Army and the Army Board of Engineers in explosives and demolition studies.

Effective December 26, 1941, the Bureau of Mines was designated by Congress to administer the Explosives Act of 1917, which was amended and invoked shortly after the United States went to war. Thereupon the Bureau set up a system of control by licensing manufacturers, dealers, and users and by establishing a field force of investigators. Licensing agents were appointed for nearly every county in the United States, regulations were promulgated under the law, and other effective steps were taken to prevent explosives or the ingredients of explosives from reaching and being used by persons hostile to the United States or persons careless or inexperienced in the use of explosives.

The far-flung health and safety activities of the Bureau assumed added importance because of the necessity for conserving skilled manpower and maintaining uninterrupted production in the mineral industries. A new responsibility in this field during the fiscal year was the setting up of the coal-mine inspection program as authorized by Congress in May 1941. Despite a delayed start, approximately 400 coal mines, producing almost 25 percent of the total coal tonnage annually produced in the Nation, were inspected up to June 30, 1942. Nearly 100 coal-mine inspectors were hired and trained and sent into the field, beginning December 1, 1941.

The Bureau continued instructing workers in the mining, petroleum, and allied industries in accident prevention, mine rescue methods, and first aid to the injured, bringing the total persons trained since 1910 to more than 1,500,000; investigating and reporting on mine explosions, fires, and miscellaneous accidents; and making field studies of various mining problems. A new unit composed of doctors, engineers, and chemists was established to investigate occupational disease in the mineral industries and to perform other important duties in the Bureau's program of improving health in this field of employment.

Other war agencies throughout the year called repeatedly upon the Bureau for economic and statistical information, and the requests were answered with full and complete data at all times. The Bureau's services in this respect included the collection, analysis, and publication of current and periodical data on all mineral commodities; studies of special economic phases of the mineral industries brought on by the war; and compilation of the Minerals Yearbook, the internationally recognized economic and statistical authority in this field. Many special statistical studies and investigations on strategic and critical metals and nonmetals, as well as fuels, were undertaken by the Bureau in cooperation with the several Government war agencies.

The Bureau published over 400 reports, including numerous bulletins, technical papers, handbooks, and Minerals Yearbook chapters. It replied to more than 100,000 letters of request for information and distributed about 550,000 copies of Bureau publications. Educational motion pictures acquired during the year totaled 546 sets; the outstanding borrowers of films from the Bureau of Mines were the Army and Navy air services, the Coast Guard, the CCC, and schools offering defense training classes.

The Bureau of Mines coordinated its work with that of other agencies of the Department of the Interior through the War Resources Council for the Department, which was established by Secretary Ickes for the purpose of mobilizing the strategic natural resources of the Nation on the scale made necessary by global warfare.

Future Work

To devote to the Nation most effectively the full benefit of its knowledge and experience for the winning of the war, the Bureau of Mines during the fiscal year 1942 made definite plans not only to utilize immediately the vast store of technical information acquired over a long period, but also to undertake new phases of work and new endeavors that would help to maintain the security of domestic mineral production and help to speed victory through the expanded output of usable strategic and critical minerals.

In anticipation of authorization and appropriation of funds by the Congress, the Bureau of Mines planned still greater enlargement of its

helium-producing facilities; an increase in its program for the exploration and development of domestic deposits of strategic, critical, and essential mineral ores; an intensification of its search and development of domestic substitutes for minerals formerly imported or for which the United States is still largely dependent upon foreign sources; and an expansion of its field investigations and laboratory and pilot-plant studies that would tend to increase production from known sources and develop usable substitutes for domestic materials in which critical shortages apparently were developing.

To expedite its future work as planned, the Bureau reorganized its operating structure during the last days of the fiscal year. Among the changes was the expansion of the Office of the Director to include an Assistant Director. As a result of new work undertaken during the year, the Health and Safety Service was expanded to include three additional divisions—a Coal Mine Inspection Division, the Explosives Control Division, and the Mineral Production Security Division.

The phases of work the Bureau scheduled for the fiscal year 1943 include the following:

The erection of pilot plants for investigating the best methods of producing sponge iron on a commercial scale will be undertaken. Direct reduction of iron ore by solid fuels and by natural gas are two of the processes to be employed to obtain a material that can be utilized during the war as a suitable substitute for scrap iron to mix with pig iron in the manufacture of steel.

To satisfy the anticipated needs of the military forces for helium, the Bureau will increase substantially its output of the noninflammable, light-weight gas by many additional millions of cubic feet. To achieve this unprecedented production goal, the Bureau planned to complete within the shortest possible time the new addition to its Amarillo (Tex.) plant, to undertake immediately the construction of a new plant, and to intensify the studies of other gas fields and to investigate possible additional plant sites.

Because of the limited known reserves of high-grade bauxite in the United States for the production of aluminum metal and for chemicals and abrasives essential to war industries, the Bureau will expand its investigations of methods of beneficiating low-grade bauxite ores, alumina-containing clays, alunite, and other potential raw materials.

Other strategic, critical, and essential minerals also will be investigated. The mineral exploration program will be expanded to include new areas and additional minerals. Hand in hand with this field work, laboratory studies of selected ores will be carried out and economic studies will be undertaken. From the data obtained, recommendations, where warranted by the facts, will be made to private industry and to Federal war agencies with a view to bringing all vital metals and nonmetals into production.

Further research will be done on magnesium in the laboratory and in pilot plants, additional studies will be undertaken on the beneficiation of chromite and on the production of electrolytic chromium, a pilot plant will be constructed and operated to obtain engineering data on the reduction of zinc concentrates with methane gas, and the resources of the West will be investigated and examined with a view to the feasibility of establishing a larger steel industry in that area.

Plans also were made for more effective enforcement of the Federal Explosives Act by the placement of explosives investigators throughout the Nation. Under the sponsorship of the Office of Civilian Defense, and in cooperation with other Federal, State, and local agencies, the Bureau will help protect the Nation's mines, quarries, smelters, and allied mineral facilities from sabotage and subversive action.

Review of the Year's Work

As the changes in the organization of the Bureau of Mines were not effected until 2 weeks before the close of the fiscal year, the activities of the Bureau described in the following paragraphs reflect the activities of the organization when it comprised four branches—Technologic, Health and Safety, Economics and Statistics, and Administrative. These branches administered and planned in Washington the activities that were carried on largely in the principal mining districts of the country through experiment stations, field offices, and district representatives.

Technological Work

Exploration of Ore Deposits

The Bureau of Mines centered its program of examination and exploration of ore deposits mainly on ores designated as "strategic" by the Army and Navy Munitions Board, namely, ores of antimony, chromium, manganese, mercury, nickel, tin and tungsten. Investigations also were started of raw material resources for western steel production (iron ore and coking coal) and of deposits of bauxite, alunite, and aluminum-bearing clay for the production of alumina. Near the end of the year, the Bureau began drilling for deep-lying magnesium chloride salts in Utah.

Highlighting the accomplishments of the year's work were the following:

About 2,345,000 tons of chromium ore—in Montana, California, Oregon, and Alaska—was added to the known reserves of the Nation. Three of the properties explored during the year already are in production.

An important new find of mercury ore of good, commercial grade was made in central Idaho, where 436,000 tons of low-grade (2.7 pounds mercury per ton) had been indicated earlier in the year in a partially developed section of the same property. The high-grade ore is in a body about 30 feet thick and at the end of the year had been reached by four diamond-drill holes over a strike length of 200 feet. It probably will be found to contain much more than 50,000 tons, averaging 8 pounds of mercury per ton. A second discovery of commercial-grade mercury ore was made by diamond drilling in an old mine in Oregon, recently closed because of depleted ore reserves.

The exploration of one deposit in Idaho indicated probable tungsten ore reserves of 150,000 tons, with reasonable expectation of developing 100,000 to 500,000 tons more. (In the 1941 fiscal year the largest and most important discovery of tungsten ore was made by the Bureau of Mines and Geological Survey. This deposit of ore is now making a substantial contribution to the war effort.) At three other tungsten mines in Nevada where ore reserves had been depleted, productive operations were resumed on new ore made known by the Bureau of Mines. Exploration at these mines was continuing at the end of the year.

Sampling in southeastern California and western Arizona revealed enough manganese ore to warrant construction and operation of one, and possibly two, 100-ton beneficiation plants, and completion of exploration in Arkansas established sufficient reserves of iron ore to warrant a 300- to 500-ton mill. More than 20,000,000 tons of iron ore were indicated by exploration of about 1 mile of an iron-bearing formation 6½ miles long in California, and over 8,000,000 tons in two other areas in Arizona and Oregon, respectively. Drilling in Georgia and Oklahoma revealed deposits of bauxite estimated to contain 165,000 tons of usable ore.

Seven hundred and forty deposits containing strategic minerals were given preliminary examination and were indexed and rated as to their relative importance. Sixty-five exploration projects were active during all or part of the year as follows: 1, antimony; 10, chromite; 3, manganese; 4, mercury; 2, nickel; 8, tungsten; 1, coking coal; 6, iron; 5, bauxite; 2, alunite; and 5, alumina clay. Some of these projects comprised work on 2 to 10 separate deposits.

Persons throughout the United States interested in the search for strategic minerals sent in samples of ore to the Bureau. More than 100 of these were examined during the year.

Metallurgical Investigations

Because many of the domestic ore deposits already known or explored by the Bureau are low-grade or complex, or both, the program

of developing and testing methods of beneficiation was given considerable attention. The laboratory investigations and pilot-plant demonstrated that substantial amounts of vital minerals for the can be made available from domestic ores.

Methods have been developed for the concentration of many : ganese ores to ferrograde manganese; for the recovery of chrom and ferrograde chromite from low-grade chromium ores; for the aration of alumina from clays and alunite; for the production of magnesia and magnesium; for the recovery of cobalt metal or e for increased production of lead; and for the beneficiation of : containing antimony, copper, iron, mercury, nickel, tungsten, : and fluorspar.

Ore Dressing.—Ore dressing provides a quick and inexpensive n to beneficiate the mined product. Studies were made of the co tration of ores containing the following strategic and critical m and minerals: Antimony, chromium, cobalt, copper, iron, manga mercury, nickel, tungsten, zinc, magnesium, fluorite, and andal. The results of laboratory investigation of about 140 ores conta one or more of these metals have been encouraging in almost a instance.

The concentration of more than 125 manganese ores from Western States was investigated. Although only half of the tested may be classified as amenable to concentration to ferro manganese, the production from these ores could make up much e indicated deficiency. Most of the ores that could not be benefie to ferrograde were readily concentrated to an intermediate g which would be desirable feed to either leaching or pyrometallur processes to produce high-grade manganese products.

Ore-dressing methods also were used in the laboratory and : plants for beneficiating manganese ores from the Eastern St. A pilot magnetic roasting and magnetic separation plant tro various manganese ore samples from the Cuyuna range of Minn and the Batesville district of Arkansas. Construction of float sink and leaching plants was undertaken to provide additional facilities for ore testing. Manganese concentration mills were des for the Batesville and the Cuyuna range districts, and for the Do district of New Mexico. Flow sheets for these mills were based laboratory and pilot-plant tests.

The ore-dressing pilot mill at Boulder City, Nev., was comp in September 1941 and immediately put in operation for treating manganese ore from the nearby Las Vegas Wash area. The operat proved the feasibility of beneficiating higher-grade ores to ferro and the lower-grade ores to an intermediate grade. Early in A 1942, the pilot mill was converted to testing the low-grade and re tory Artillery Peak (Ariz.) ore.

The Chamberlain (S. Dak.) pilot manganese-concentration plant is treating the nodule-bearing shale of the area to recover nodules. The process includes hand sorting, kiln drying, and screening the nodules from the shale. For experimental purposes, an explosive shattering unit was added to the plant.

Hydrometallurgy.—Numerous laboratory leaching tests on manganese ores that were not amenable to concentration by ore-dressing methods were completed. New procedures for dissolving manganese from the ore were devised and older processes improved. The nitro-sulfur dioxide process reached the pilot-plant stage. The sulfur dioxide-sulfuric acid leach was modified to produce a high-grade product from ores containing up to several percent phosphorus. Large-scale laboratory leaching tests using smelter flue gas containing sulfur dioxide were conducted. A new process was developed that may be used on manganese ores containing appreciable quantities of objectionable impurities, such as zinc.

The hydrometallurgical pilot plant treated ores too low grade for direct use in standard industrial ferro-alloy production. The manganese from low-grade ores was leached with sulfur dioxide, nitrogen dioxide gas, or dilute sulfuric acid. Manganese sulfate or manganese carbonate was obtained by evaporation of excess water. Further treatment by this leaching method yielded material highly suitable for electrolytic deposition of high-purity manganese metal in the pilot plant.

Domestic chromium ores usually may be concentrated to a product of low chromium:iron ratio. Reduction roasting of subgrade concentrates followed by acid leaching of the iron produces a residue which is smelted to standard ferrochrome. Construction of a 25-ton-per-day reduction roasting and leaching pilot plant was undertaken. A process was developed for recovering cobalt from domestic low-grade oxidized cobalt ore. This process yielded a high-grade cobalt oxide or cobalt compound suitable for the production of electrolytic cobalt metal.

Studies of various proposed methods for preparing alumina from bauxite, clays, and other aluminum-bearing materials resulted in the selection of a procedure for investigation in a small pilot plant. Samples from most Western States were run through the plant. The operation included dehydration of the clay followed by an acid leach. The electrolytic precipitation of hydrous alumina and the dehydration of alum produced in various ways were studied. Production of metallic aluminum from these products will be investigated.

Electrometallurgy.—The operations of the electrolytic manganese pilot plant determined optimum electrolyte concentrations, economic current densities, and the most satisfactory cell-room equipment for

commercial installations. Current efficiency was increased to 60 percent.

A process for producing magnesium metal by direct electrolysis of magnesia in a fused salt bath was developed. It showed excellent possibilities for utilizing domestic magnesites and dolomitic ores. An 8,000-ampere pilot electrolysis cell was placed in operation. Electrothermic reduction of magnesia by carbon is potentially a superior process for producing magnesium metal. Improved methods of overcoming technical difficulties were developed in a small pilot plant at Pullman, Wash. Methods also were developed for the production of high-purity electrolytic chromium.

Conditions were established for the electrodeposition of metallic cobalt from solutions obtained by the treatment of low-grade oxidized cobalt ore.

Pyrometallurgy.—Refractory low-grade manganese ores were successfully smelted with pyrite in an electric arc furnace to produce a manganese sulfide matte. This matte can be used as such in the steel industry or can be sintered to a 60-percent manganese product that will meet ferrograde manganese specifications. Fine, high-grade manganese oxide and carbonate ores, manganese carbonate flotation concentrates, calcines from deleading manganese oxide flotation concentrates, and calcines from the treatment of manganese sulfate were successfully sintered to meet ferrograde specifications.

The recovery of vanadium from titanomagnetites by smelting a sintered concentrate in the 6-ton University of Minnesota experimental blast furnace was investigated. Results showed trends that may be investigated in more detail in industrial furnaces and should lead to the recovery of a substantial quantity of vanadium from domestic deposits heretofore not utilized.

Methods were developed for taking advantage of the more rapid smelting rates for lead on the Scotch hearth furnace, using pelletized, richer and more finely divided flotation concentrates. A mechanical charging device was designed and installed. It was found that a good portion of the zinc wasted to lead blast-furnace slags may be separated and saved.

Testing Methods.—Many ores containing war minerals were subjected to microscopic examination, chemical analyses, and physical testing. In all, 3,500 prospectors' samples were tested for the occurrence of strategic minerals. The properties of various alloy systems were studied. New equipment was designed and built to extend the facilities of the laboratory. Considerable X-ray work was done on determining the structure of various alloys and in distinguishing between closely related minerals.

The investigation of the thermoelectric method of checking the composition of metals was continued to materials of higher alloy

content. Its usefulness in making acceptance tests on purchased materials and in sorting scrap metal was demonstrated. A simple, quick method, based upon the emergence of substances of fixed melting points, was developed for determining the temperature of molten metals, and work was begun to produce a complete series of test substances.

Metallurgical Fundamentals.—Because the control and improvement of energetics of processes for critical metals require precise data on the various forms of energy content involved in transformations of these substances, the Bureau determined the quantities of the various energy forms for the most important critical substances, with special emphasis on manganese, chromium, and magnesium. The magnetic properties of certain manganese alloys also were studied.

Nonmetals Research

The Bureau of Mines met heavy demands for cooperative assistance in the field of nonmetals, as well as metals, by the Federal war agencies.

The removal of impurities from low-grade bauxite by gravity-washing and froth-flotation methods was undertaken just before the beginning of the fiscal year, and by October 1941 improved methods of washing were determined.

A special appropriation for the investigation of calcium aluminate processes for extracting alumina from siliceous bauxite was used to test the Seailles process. The conclusion was that while the process can be operated technically, it is not attractive from the economic and practical standpoints. The lime-soda sintering process was one of the methods thought to be more practical. A sequence of operations was worked out that gives high extractions and recoveries of alumina of satisfactory grade. The process was scheduled for testing in a subcommercial test plant in the fall of 1942.

Foreseeing that the metallurgical demands for bauxite would make it necessary to substitute clay for bauxite in making aluminum sulfate (used in water treatment, paper manufacture, etc.), the Bureau undertook studies on preparing clays to make them suitable for this purpose. As a result substitution of properly calcined kaolins for bauxite can be recommended; and the War Production Board was reported to be working out the means for the production and use of such clay.

Substitutes were found for Indian kyanite, a mineral used for special refractories, formerly imported from near Calcutta. The most attractive one is topaz, which can be mined commercially in South Carolina. The War Production Board reported it is making arrangements for commercial production.

The shortage of flake graphite, normally imported from Madagascar,

for crucible and steel-ladle stoppers was foreseen during the fall of 1940, and work was initiated on the Alabama graphites that had been exploited during the First World War. A far larger size of flake now is needed than in 1917. Suitable means of milling the graphite rock were developed. The War Production Board, guided by these results, made arrangements for building five mills in three States.

Radio ceramic talc suitable for radio insulators was found to be insufficient for expanded needs during the winter of 1941. The Geological Survey sought suitable grades of talc available in quantity and the Bureau of Mines did the technical work of testing the talcs. Many were found to need flotation to remove impurities. Increased production along the lines recommended by the Bureau of Mines is expected.

The war in Europe cut off Belgian glass sand, which had supplied Pacific coast glass plants. A study was made of methods for scrubbing off iron stains and removing feldspar and heavy minerals from West coast sands. One of the larger glass companies undertook construction of a plant at Monterey, Calif., which will incorporate the Bureau's findings and produce high-grade sand in large quantities.

Deposits of the volcanic rock, dunite, made up mostly of olivine, exist in the Eastern States, as well as in the Far Western States, and electric-furnace fusion of the rock with sufficient reducing agent produces ferrosilicon and fused magnesium silicate, or forsterite. Tests of brick made with the forsterite showed it to be a desirable supplement to magnesite brick and usable as a substitute for refractory material formerly imported from Austria and Greece.

Coal and Coal Products

The Bureau of Mines expanded the consulting service that it maintains for all the Government agencies for: (1) The purchase and operation of steam generating and heating equipment, (2) the purchase and analysis of coal, and (3) the conditioning of water used in boilers. Consultation, acceptance tests, and inspections were provided on numerous equipment installations, particularly for the War Department. Attention was directed to the conversion of Federal plants on the East coast from oil- to coal-burning equipment.

More than 15,000 coal analyses were made and about half of these were in connection with the purchase of 3,130,000 tons of coal for the War and Navy Departments and 518,000 tons for other Government agencies. To obtain analyses for awarding Government coal contracts, Bureau of Mines coal-sampling trucks visited 468 mines in 12 States and collected 1,740 samples, primarily in areas adjacent to new war activities.

Coking Coal.—The construction of seven new blast furnaces in the West has created a demand for western coals that have satisfactory

coking properties. The Bureau's field exploratory crews and the coal-carbonization laboratory in Pittsburgh showed that certain coals of Oklahoma, Arkansas, Utah, New Mexico, Colorado, and Wyoming will meet the needs. The survey of the coking properties of coals of the United States, which the Bureau of Mines began in 1927, has been especially valuable in the selection and blending of coals for blast-furnace coke. Bureau of Mines laboratory research also provided information for coke-plant operators on the storing properties of coals of various compositions.

Gasoline From Coal.—The Germans, who have been working on processes for the conversion of coal to gasoline and oil since 1913, were so successful that it is estimated now that their plants will produce about 5,000,000 tons of gasoline annually. The Bureau has experimented with a hydrogenation process for several years and has determined the amenability of many American coals to liquefaction, which will be most useful in the future; moreover, the Bureau has developed a relatively low pressure hydrogenation treatment for producing a heavy fuel oil suitable for use as Bunker C oil. Valuable byproducts, such as phenols, cresols, and xylenols, also can be obtained from coal-hydrogenation products. The Fischer-Tropsch water-gas method is to be investigated during the coming year. Hydrogenation byproduct lignin from paper-pulp manufacture has been found to yield isopropylcyclohexanol, a material valuable in the plastics industry and of possible importance as an antiknock addition agent to gasolines.

Boiler Water.—Proper conditioning and treatment of boiler waters assumed added importance because of the war demand for uninterrupted steam production. Analyses of boiler water samples by the Bureau increased by 250 percent over 1941. Material improvement in efficiency and economy for boilers operated by the War Department resulted from this water-conditioning service.

Coal Storage.—To protect industrial and domestic consumers against coal shortages, storage of ample quantities of coal became essential. Because bituminous and subbituminous coals are subject to spontaneous heating and ignition, the Bureau instituted a survey of the action of coal under storage conditions in industry to determine the best practical methods of storing individual coals.

Coal Mining.—The Bureau initiated studies relating to consumption of power in the mines and indicated ways and means of effecting economies with no losses in efficiency.

Petroleum and Natural Gas

Although the war did not change the character of the research and investigative work of the Bureau of Mines on petroleum and natural

gas, it changed the emphasis on particular problems, created demands for volumes of factual data, and allowed less time in which to assemble and collate essential information. The Bureau was able to respond to the immediate needs of the War and Navy Departments, the Office of the Petroleum Coordinator for War, and other Government agencies for technical advice and information on several phases of the national program of supplying petroleum products for war uses.

Petroleum engineers of the Bureau made a survey of more than 200 crude oils and of the products from 25 condensate plants to determine their content of high-octane aviation-gasoline stock. They also undertook a series of tests to determine the most effective blending of various components of 100-octane aviation gasoline, and initiated a study to determine the components of the reservoir fluids and the available reserves in fields of the condensate type which yield hydrocarbons needed in aviation gasoline. Other typical assignments included a study of all possible petroleum sources of toluene for use in the manufacture of explosives, and a study of the possibility of augmenting supplies of paraffin wax.

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The Bureau turned the whole chemistry and refining program of the Petroleum Experiment Stations at Bartlesville, Okla., and Laramie, Wyo., to the search for technical answers to current practical questions regarding the essential nature of crude oils, natural gas, condensates, and their components. High-efficiency fractionating towers were designed and built; work progressed on desulfurization of marginal aviation-gasoline base stocks to improve their response to tetraethyl lead; and reports gave valuable information on volume and types of asphalts needed for military airport runways and roads.

Reports on the Bureau's methods of collecting and examining subsurface samples of petroleum, the results of its field studies, and a new basis for analyzing reservoir behavior, using pressure-production data, have advanced the technology of determining oil and gas reserves and pointed toward advisable methods of withdrawal under war conditions. Special attention was given to the effects of high gas:oil ratios, excessive pressure declines, and abnormally low rates of water encroachment. Subsurface samples were taken in various fields and analyzed for quantity of gas in solution, shrinkage resulting from gas liberation, and composition of the oil-gas mixtures in reservoirs. Core samples were subjected to connate water determinations, and studies were made of the permeability of porous rocks and productivity indexes of wells and fields. Contributions were made to the subject of well

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The Bureau conducted tests on tanks which gave valuable information on changes that may be expected in aviation gasoline and evaporation losses of blend components stored for the war use.

The far-sighted policy of research, development, and conservation followed since the Bureau's helium program was initiated during the last World War makes it possible to supply this gas in quantity to the United States armed forces in the present conflict. The Amarillo (Tex.), helium plant produced more helium in 1942 than in any previous fiscal year. The Amarillo helium plant is being enlarged, and a new plant is being built. The Cliffside field now has a total of nine wells producing helium-bearing gas.

Explosives

Experimental research on explosives developed new findings, many of which are directly applicable to military explosives and have been used by the war agencies. The research program included studies of sheathed explosives, the production of toxic gases by explosives, the ignition hazards of explosives when used in the presence of combustible gases and dust, the strategic properties of liquid-oxygen explosives, and an underlying inquiry into factors affecting the temperatures and pressures developed by explosives.

For protection of equipment and personnel in special war industries against very rapid gas explosions, certain high-speed explosion diaphragms were developed; and to assist the synthetic rubber and plastics industries, studies were made of explosion and inflammability characteristics of butadiene, styrene, acrylonitrile, chlorobenzene, and trichlorethylene. Other studies included one of methods of preventing explosions due to hydrogen liberation in the charging of storage batteries. Further work was done on the use of helium in preventing explosions of anesthetic mixtures; and a study of the chemical factors controlling anthracite mine fires was completed.

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For safeguarding war industries using Diesel engines in explosive or combustible atmospheres, a testing gallery was completed and put in operation.

The Bureau explosives-testing program, carried on for many years with a view to maintaining safe characteristics in explosives and blasting devices used by the mineral industries, moved forward rapidly. The Bureau made 111 chemical analyses, 958 gallery tests, and 678 control tests of a physical nature in the 1942 fiscal year.

As part of the scientific research carried out in connection with administration of the Federal Explosives Act the Bureau, at the request of the Ordnance Department of the Army, made plant-security studies of some ordnance facilities and developed valuable information relating to manufacture of explosives. The Bureau also made some demolition studies in cooperation with the Army.

Several disasters were investigated, including those that occurred at a black powder plant, a primer plant, two pyrotechnic plants, a railroad torpedo plant, and a quarry.

Since the increasing use of inflammable metal powders in the war industries has created new and additional dangers from dust explosions, the Bureau extended its studies of metallic dust hazards. One result was the discovery that hard pitch (in granulated form) is an excellent agent for extinguishing magnesium fires in industrial plants where the use of sand and similar agents might harm machinery and equipment.

The Bureau assigned an engineer to cooperate with the Chemical Warfare Service of the War Department, in connection with the latter's civilian protection activities, to conduct training work and to assist in the research work on the extinguishment of incendiary bombs and on kindred war problems.

Upon completion of its studies of the effects of seismic vibrations from quarry blasts, the Bureau began a study of air waves from blasts, and the technique developed was applied to military problems.

Safety, Plant Protection, and Health Activities

Conservation of manpower and mining equipment and the protection of mineral facilities from serious damage or destruction by carelessness, neglect, sabotage, or subversive action were made paramount by the war. Safety education and accident-prevention work, supported by investigative and testing activities, carried on in the same manner and with equal effectiveness as in past years, constituted the keystone of the vastly expanded safety and security program. The power of entry to coal mines, conferred on the Bureau by the Federal Coal Mine Inspection Act enacted in the previous fiscal year (May 1941), and the regulatory powers granted by the Federal Explosives

Act approved December 26, 1941, as well as the broad authority implied in Executive Order 9165, of May 19, 1942, dealing with the national facility security program, proved to be of considerable assistance.

The need for safety education and training and retraining of mineral industry workers in first-aid, accident prevention, and mine rescue operations, became progressively greater as increasing numbers of employees were drafted for military service, migrated to better-paying war industries, or absented themselves, leaving their ranks to be filled by men inexperienced and untrained in the newer mechanized operations.

Safety Work

Engineers and safety instructors of the Bureau trained 90,206 employees of the mining and affiliated industries in first aid and mine rescue during the fiscal year, bringing the total number of persons who have completed such courses since the establishment of the Bureau in 1910 to 1,538,758. Moreover, with the training of 1,459 persons as first-aid instructors, more than 16,000 persons throughout the country became qualified to teach the Bureau of Mines first-aid course in the civilian defense program of the Office of Civilian Defense. During 1942, 117 additional mines and plants were awarded certificates showing that all employees had been trained in first aid. Since the Bureau has been convinced that persons trained in first aid are less likely to injure themselves or be involved in accidents, it has further promoted such training by endorsing and aiding first-aid competitions. During the year, it awarded certificates to 1,072 persons who qualified as judges for first-aid contests and assisted in conducting 61 first-aid contests in 11 States.

The Bureau's personnel instructed 2,008 mine workers in mine rescue work, and gave its advanced mine rescue training course to 138 persons during the year. These men, familiar with the use of gas masks, oxygen breathing apparatus, and procedures connected with fires and explosions in confined places such as mines and tunnels, constitute an efficient reserve for use in civilian defense and rescue work.

At virtually all major mine disasters, Bureau personnel assisted in the rescue and recovery operations, sometimes at the risk of life or limb. The Bureau's engineers investigated 24 mine explosions in 11 States, 25 mine fires in 15 States, and 52 miscellaneous accidents in 24 States during the year. Rigid inspections were made of 43 privately owned mine rescue stations at the request of the owners.

The Bureau's plan of giving accident prevention courses was continued. During the year 112 persons were trained in the course for coal-mine officials. A total of 8,521 mine officials and others have

taken the complete course, and 5,122 have received partial training since 1930 when the course was inaugurated. The accident-prevention course, especially designed for coal miners, has been given in complete form to 1,841 miners and in partial form to 795 others since the course was organized in 1940. An accident-prevention course for metal miners was introduced and given to 160 metal-mining officials. During the fiscal year, 170 persons completed a course of instruction in petroleum safety, and 120 others received part of the training.

In its safety education program for the mineral industries, the Bureau utilized motion pictures, slides, exhibits, testing galleries and similar educational tools extensively. During the year, sound motion pictures on safety subjects were exhibited 170 times at safety meetings. Thirteen safety exhibits were shown in 10 States at fairs and expositions in mining districts and at mining conventions. The Bureau's representatives attended, and at times addressed, 612 safety meetings held in 33 States.

Testing work on electrical machinery and equipment, to determine their safety for use in gassy and dusty atmospheres in mines, was continued. The Bureau approved 50 additional machines and types of apparatus during the year, and made 282 explosion tests for the Navy on certain explosion-proof enclosures intended for use on ships.

The Bureau has three all-steel railroad coaches equipped for safety training and for recovery work following mine disasters; two are in active service, and one is held in reserve for emergency use.

The yearly Nation-wide statistical survey of mines, quarries, mills, smelters and coke ovens, which reveals the number of men employed, man-hours worked, and the number and causes of occupational accidents, was made again, bringing up to date this information that is essential to accident-prevention work. A preliminary survey also was begun to obtain accident data on the petroleum industry.

Coal-Mine Inspection

Although the Federal Coal Mine Inspection Act of May 7, 1941 (Public Law 49, 77th Cong.), was passed before the United States entered the war, its importance in the war effort has increased correspondingly with the growing dependence on coal to keep the Nation's vital industries operating at full speed. Despite a delayed start in inspecting mines, because of the time required for examining, qualifying, certifying, and appointing applicants through the Civil Service Commission and for training the new inspectors in the Bureau's policies and procedure, 400 coal mines in all were examined between December 1, 1941, and June 30, 1942.

Most of the mines inspected were the larger ones; their combined production was 24.7 percent of the total annual output for the United

States in 1941, and their combined employment was 117,346 persons, or 21.9 percent of the total coal-mine employment in that year.

The mine inspections consisted of a thorough examination of the local conditions, including careful observation and study of the practices, conditions, and equipment in and about the mines, the collection and analysis of dust and air samples, and a compilation and interpretation of the mine accident records. A preliminary report, calling attention to the hazards that require immediate attention, was posted at the mine at the completion of each inspection; and a detailed report, available for public inspection, was transmitted later to the management, the miners' labor organizations, and the State mine inspection agency.

The reception of the inspection program by the industry was favorable generally, once the inspection work got under way. Although there were some criticisms, mine management, mine workers, and State inspection services demonstrated their cooperativeness. In many instances, hazardous conditions and practices pointed out by the inspectors were corrected immediately.

In addition to the inspections, inspectors and other engineers of the Bureau made special investigations relating to explosives and electrical equipment in mines and other individual phases of coal mining.

Federal inspection of mines has not been in operation long enough to determine what effect it will have on the disaster and accident records of the country. The inspection procedure is, however, exerting a definite influence toward the reduction of accidents, in spite of handicaps resulting from the war. According to available records, all major industries have shown far greater increases in accident rates than the coal-mining industry since war production entered its peak phases.

Explosives Control

The Bureau of Mines is charged with administering the Federal Explosives Act of 1917, which was amended and invoked on December 26, 1941 (Public Law 381, 77th Cong.). Aimed at the prevention of sabotage and the misuse of explosives, it provides for control of the manufacture, purchase, sale, use, and possession of nonmilitary explosives and explosives ingredients by means of a licensing system, accompanied by investigations of the manufacture and storage, thefts or losses of explosives, and fires and explosions in which explosives are believed or known to be a contributing factor. Regulations promulgated by the Bureau have the force of law, and violations thereof are penal offenses.

The Bureau appointed 4,400 licensing agents throughout the United States and Territories and possessions. These licensing agents, who serve without pay except for a 25-cent fee which they are entitled to

collect from each person to whom a license is given, issued about 145,000 licenses to vendors, purchasers, and foremen by the close of the fiscal year. The Bureau itself examined and acted upon 2,000 additional applications for licenses from manufacturers, schools, colleges, and laboratories.

Forty-eight explosives investigators were appointed and stationed in the various States and in Alaska to supervise and guide the licensing agents and to investigate the manufacture, handling, and use of explosives. Inasmuch as the mineral industries are the principal nonmilitary users of explosives, the investigators' work was directly connected with the safety and mineral security program of the Bureau. The investigators, who made reports on more than 750 stores of explosives of which 450 were in critical areas, were assisted by other engineers and technicians of the Bureau in investigating fires and explosions in mines, quarries, munitions plants, and fireworks factories.

To facilitate its explosives control work and to coordinate it with the entire Federal program, the Bureau established liaison with the Army and Navy Intelligence services, the Office of Civilian Defense, and the office of the Chief of Ordnance and the Provost Marshal General.

Information was collected by the Bureau, as in past years, on the quantity of industrial explosives manufactured and used in the United States, and the estimated quantity of nitroglycerin and other ingredients used in the manufacture of explosives.

Antisabotage

As its part in the Nation-wide emergency program of the Federal Government to protect vital production, supply, storage, and transportation facilities, the Bureau undertook to make secure the continued production of vital war material from the metal mines, coal mines, quarries, mills, smelters, and allied mineral facilities. The Bureau received an allotment of funds from the appropriation made by Congress for this program toward the close of the fiscal year. The administrative organization to handle this work was set up, and the Bureau prepared to employ and train an initial field force of 75 to 100 engineer-investigators who could carry out the work in close coordination with the mine inspectors, explosives investigators, safety engineers, and other field personnel of the Bureau, as well as in co-operation with the field personnel of other Federal agencies concerned in the facility security program.

Health in the Mineral Industries

Activities of the Bureau in the field of health were expanded during the year. A new unit comprised of doctors, chemists, and

engineers was established to make investigations and studies of occupational diseases in the coal-mining industry, in conjunction with the inspection work; and the Bureau's gas and dust laboratory was enlarged to handle the greatly increased volume of analytical work created by the large quantities of mine gas and dust samples received from the mine-inspection field force. The laboratory analyzed 5,300 gas samples as compared with approximately 1,500 during the previous fiscal year.

The Bureau tested scores of respiratory devices for protection against noxious gases, fumes, and dusts, which were submitted by manufacturers, and gave its approval to several such devices. Manufacturers were advised on the development of more efficient respiratory equipment, and information was provided the public on the use and limitations of existing respiratory equipment. The Bureau issued more than a dozen publications on air contamination or contaminants.

At the request of, and in cooperation with, the Army and the Navy, confidential studies were made with respect to health factors in some military equipment.

Through laboratory studies and through investigations in underground tunnels in New York, Tennessee, and Colorado, the Bureau obtained information that may be of value in increasing the use, under well-controlled conditions, of Diesel equipment on underground main haulage without hazard to health.

At the request of the New York City Tunnel Authority, the Bureau also investigated the probable effects of air contamination at a portal of a newly projected vehicular tunnel. Tests also were made in a wind tunnel, the results of which may lead to the safe ventilation of vehicular tunnels without contamination of the atmosphere at the mouths of such tunnels.

Economics and Statistical Services

The accelerated demands resulting from the war for current comprehensive data on production, trade, distribution, supply, and consumption of minerals and mineral commodities on the part of the operating divisions of the Bureau, as well as the increasing needs on the part of the other Federal war agencies and the war industries, resulted in a marked expansion of the Bureau's economics and statistical services. In addition to the collection, analysis, and publication of current and periodical data on all mineral commodities, the Bureau studied and reported on special economic phases of the mineral industries, with particular emphasis on the strategic and critical metals and nonmetals and the fuels required by the war industries.

By means of the available data and through representation on committees and conferences, the Bureau was able to advise the war

agencies on threatened bottlenecks in supply, on advisability of expanding plant facilities, on production and plant capacities, and on possible substitution of some minerals for others.

The Minerals Yearbook (Review of 1940) was published at a much earlier date than in the previous year, and the preprints of all chapters were available by August 1941. Many chapters of Minerals Yearbook (Review of 1941) were prepared and some were available for distribution by the close of the 1942 fiscal year.

Metals

Although domestic metal-production facilities were sustained at maximum capacity throughout the year, the demand for metals in many cases exceeded the supply, and as a result the Government imposed a priority allocation system and placed severe restrictions on the consumption of critical metals by other than the war industries. To keep pace with the rapidly shifting situation, the Bureau's war-time augmented staff of commodity experts was frequently consulted and the Bureau provided the war agencies with detailed statistical studies of 30 commodities on a monthly basis to cover both producer and consumer phases. In the case of many of the metals, similar data were furnished to show the picture of raw materials used. Of a total of 120 separate surveys conducted during the past fiscal year, 75 were designed specifically for the use of war agencies. This not only represents an increase in the number of surveys undertaken but also a marked expansion in the number of persons replying to Bureau questionnaires.

As the problem of obtaining additional supplies of new metal became more acute, the question of available secondary metals was raised to major importance. The Bureau, now operating under policies outlined in the general preference orders of the War Production Board, converted the quarterly iron and steel scrap survey to a monthly statistical review showing stocks, receipts, production, consumption, and other data as reported by about 19,000 respondents, including producers, dealers, brokers, and consumers of scrap. Results of the surveys were made available to various war agencies and served as the basis of much of the scrap allocation program. Surveys of 3,000 consumers and 4,000 dealers of nonferrous scrap were broadened to include the reports of metal produced from scrap as well as scrap consumed. Magnesium was included for the first time in the growing roster of scrap metals.

The monthly canvasses of copper, lead, and zinc production inaugurated the previous year also were expanded. The usual preliminary reviews of nonferrous metal mining, including gold and silver, in 13 Western States in 1941 were released by the middle of January

1942; and final detailed statistics on copper, lead, and zinc for each of the 13 Western States and for Alaska, for incorporation in the individual chapters of *Minerals Yearbook*, 1941, were completed before the end of June 1942.

Nonmetals

In addition to the regular, periodic compilation of data on non-metallic minerals, including two monthly cement reports, a quarterly gypsum report, and a semiannual phosphate rock report, the Bureau made monthly canvasses of mica, graphite, asbestos, barium oxide, and natural sodium compounds; a semimonthly canvass of cement; and special canvasses of quartz crystal, mineral pigments, and industrial diamonds.

Special studies also were conducted by staff members on the sources of high-grade dolomite needed for making magnesium metal; sources of magnesia; processes for recovering magnesia from dolomite; magnesia refractories; resources and uses of monazite; uses and supplies of strontium; sources of high-grade clays for aluminum salts; and nonmetallic mineral industries in the South.

The Bureau compiled a review of all important trends and accomplishments in the nonmetallic mineral field in 1941; and, to assist present or prospective operators in securing markets for their products, developed special facilities and prepared a series of reports covering the marketing problems of various minerals and including lists of prospective buyers.

Petroleum and Natural Gas

The Bureau continued its comprehensive collection of statistics and economic data covering the operations of the petroleum and natural gas industries. Although the Bureau has no jurisdiction with regard to transportation shortages, control of production, rationing, readjustments in refinery operations and similar problems brought on by the war, it was able to assist those Government agencies responsible for solutions with essential current data.

The monthly statistics of aviation gasoline, initiated in October 1939 and supplemented by capacity surveys, proved of special value to the program of expanding output to meet war requirements. The Bureau adapted and altered its work on forecasts to meet Government requests for longer-term estimates of national demands, as well as to forecast requirements on critical areas such as the East coast. The forecast of demand for crude petroleum by States of origin found use as basic data for Federal allocations.

Coal and Coke

Because of the altered conditions in the coal and coke industry brought about by such factors as the increased needs for metallurgical coke, the off-season demand for solid fuels, and the greater storage of coal by consumers in anticipation of transportation difficulties, the Bureau found the Federal war agencies dealing with this industry in need of more comprehensive and more up-to-date statistical information. Accordingly current studies were expanded, new studies were inaugurated, and the dates for the return of questionnaires by the industry were in many cases moved ahead.

The Bureau completed according to schedule its regular annual reviews on developments in the Pennsylvania anthracite industry and the lignite, byproduct and beehive coke, fuel briquet, packaged fuel, and peat industries; and continued its monthly and weekly reports on the various phases of the anthracite, coke, and byproducts industries. At the same time, it furnished the war agencies with special reports.

A field survey on the dredging of anthracite and an historical study of the production of coal, petroleum, natural gas, and electricity in the United States, 1929-40, were completed.

Data on Foreign Minerals

The lack of statistical and economic data formerly obtained from official sources in Axis and enemy-occupied countries, and suspension of the publication of similar data usually obtained from allied and neutral countries prompted the Bureau to establish a service whereby essential statistical information relating to current production, stocks, and exports of strategic and critical minerals is obtained on a confidential basis from official sources in nonenemy countries.

As a result of the Bureau's policy of withholding publication of all data that might give aid to the enemy, publication of foreign statistical and other economic information was stopped but was provided on a confidential basis to all war agencies.

The five foreign mineral specialists assigned the previous year as technical advisors to certain of the American embassies in Latin America continued in the same status during the current fiscal year. A mining engineer was assigned to Mexico for checking Mexican resources of mica, manganese, tungsten, tin, mercury, and other strategic minerals.

Public Information

In response to direct requests from individuals and agencies concerned in mineral production, the Bureau distributed about 196,000

copies of the Bureau's printed publications and approximately 350,000 processed reports and monthly lists of publications. About 100,000 copies of the printed reports of the Bureau were sold by the Superintendent of Documents.

The Bureau decided that some of the material published previously might be of aid and comfort to the enemy, and for that reason, as well as the desire to economize wherever possible, discontinued a few of its publications such as the *Foreign Minerals Quarterly*, and changed its other reports dealing with foreign conditions to a confidential basis. Other current reports dealing with demand, supply, and consumption of strategic and critical minerals also were placed on a confidential basis and their distribution was restricted to a limited list of Federal officials. All other publications were carefully reviewed to avoid the disclosure of vital information; the size of the editions of processed material was cut, and the style altered with the resultant saving of about 400,000 sheets of paper.

Exactly 440 reports (comprised of 22,500 manuscript pages and 1,800 illustrations) were prepared for publication as bulletins, technical papers, handbooks, *Minerals Yearbook* chapters, and contributions to technical journals. The Bureau added 3,314 books to its Washington library; received 295 periodicals; and loaned 23,788 publications for outside use. In addition to the thousands of letters dealing with technical material, the Bureau replied to more than 70,000 letters from the public requesting publications or general information on minerals. Ten exhibits illustrating the Bureau's work were prepared and shown.

Educational motion pictures from the large film library of the Bureau were circulated more extensively than ever. The Army Air Forces, the Naval Air Stations, the Coast Guard, the N. Y. A. and schools, colleges, and other centers for defense training were outstanding borrowers. The total number of showings during the year was reported as 99,699, with an estimated attendance of 10,366,166 persons. The Bureau acquired 546 sets of new films, all made, in accordance with past procedure, in cooperation with industrial concerns that pay all of the costs of production and provide the Bureau with copies for free loans.

Administration

The Bureau's activities during 1942, as in past years, were administered from Washington, D. C., but were carried on mainly in the field. The Bureau opened a new petroleum field office at Franklin, Pa., and a new district office for health and safety work at Mount Hope, W. Va.

Personnel

On June 30, 1942, there were 2,104 full-time employees on duty in the Bureau, as shown in the following table:

Classification and number of appointees

	Profes- sional	Subpro- fessional ¹	C.A.F.	Cus- todial ²	Total
Washington.....	³ 66	4	301	6	377
Pittsburgh.....	⁴ 146	88	141	82	457
Field.....	⁵ 613	157	291	209	1,270
Total.....	825	249	733	297	2,104

¹ Includes instrument makers, etc.

² Includes laborers, mechanics, etc.

³ Engineers, 14; chemists, 4; metallurgists and metallurgical engineers, 3; miscellaneous, 45; total, 66.

⁴ Engineers, 48; chemists, 53; metallurgists and metallurgical engineers, 3; miscellaneous, 42; total, 146.

⁵ Engineers, 221; chemists, 71; metallurgists and metallurgical engineers, 98; miscellaneous, 223; total 613.

In addition to the foregoing full-time employees, there were 798 employees holding appointments on a when-actually-employed basis as follows: 42 consultants; 125 excepted; 13 classified; 3 unclassified; and 615 field agreements.

Property

The records as of June 30, 1942, show that the property of the Bureau had a total valuation of \$7,320,530, of which \$3,209,606 was for land, buildings, and improvements; \$1,127,928 for machinery and power-plant equipment; \$713,415 for laboratory equipment; and the remainder for certain helium properties, office furniture, automobiles, and other goods.

Finances

The total funds available to the Bureau of Mines for the fiscal year ended June 30, 1942, including direct appropriations, departmental allotments, reappropriated balances, and sums transferred from other departments for service work, were \$10,894,518. Of this amount, \$9,133,940 was spent, leaving an unexpended balance of \$1,760,578. On the regular work of the Bureau, \$7,210,643 was expended. These figures are subject to revision because of unpaid obligations.

Table 1 presents classified and complete information regarding the financial history of the Bureau since its establishment in 1910.

Table 2 gives a statement of the distribution of congressional appropriations to the branches and divisions and the expenditure of these funds in 1942 by Bureau divisions.

BLE 1.—Bureau of Mines appropriations and expenditures, fiscal years ended June 30, 1911-42

Fiscal year	Appropriated to Bureau of Mines	Departmental allotments ¹	Funds transferred from other departments ²	Total funds available for expenditure	Unexpended balances	Total expenditures	Expenditures, exclusive of service items ³
1911	\$502,200.00	\$34,200.00	-----	\$536,400.00	\$22,818.27	\$513,581.73	\$513,581.73
1912	475,500.00	45,640.00	-----	521,140.00	6,239.77	514,900.23	514,900.23
1913	583,100.00	47,850.00	-----	630,950.00	4,087.20	626,862.80	626,862.80
1914	664,000.00	57,307.79	-----	721,307.79	4,678.29	716,629.50	716,629.50
1915	730,500.00	55,424.60	-----	785,924.60	4,178.11	781,746.49	781,746.49
1916	757,300.00	48,710.87	-----	806,010.87	9,058.63	796,952.24	796,952.24
1917	981,000.00	52,400.00	-----	1,033,400.00	48,588.10	984,811.90	984,811.90
1918	1,467,070.00	51,901.98	\$3,062,000.00	4,580,971.98	395,745.10	4,185,226.88	1,172,939.64
1919	3,245,285.00	49,542.86	\$8,600,000.00	11,894,827.86	2,452,236.78	9,442,591.08	1,137,471.37
1920	1,216,897.00	52,800.00	-----	1,269,697.00	9,592.18	1,260,104.82	1,245,891.36
1921	1,362,642.00	62,618.72	666,720.00	2,091,980.72	13,985.89	2,077,994.83	1,412,923.15
1922	1,474,300.00	59,800.00	182,200.00	1,716,300.00	52,120.45	1,664,179.55	1,483,038.47
1923	1,580,900.00	70,814.30	97,100.00	1,748,814.30	10,959.08	1,737,855.22	1,640,840.57
1924	1,784,959.00	50,710.00	347,820.00	2,183,489.00	38,085.43	2,145,403.57	1,804,800.41
1925	2,028,268.00	57,500.00	236,465.86	2,322,233.86	107,743.20	2,214,490.66	1,998,669.20
1926	1,875,010.00	81,220.00	510,501.15	2,466,731.15	28,891.78	2,437,839.37	1,841,150.80
1927	1,914,400.00	94,443.39	325,000.00	2,333,843.39	44,871.29	2,288,972.10	1,926,910.12
1928	3,025,150.00	113,266.45	328,000.00	3,466,416.45	7,736,235.62	2,730,180.83	1,997,270.06
1929	2,725,118.00	103,000.00	205,500.00	3,753,094.67	8,152,701.34	3,000,393.33	2,280,960.68
1930	2,274,670.00	123,300.00	166,200.00	2,664,386.38	8,135,714.93	2,548,671.45	2,216,995.72
1931	2,745,060.00	120,680.91	166,500.00	3,134,595.10	10,195,534.37	2,939,060.73	2,304,121.45
1932	2,278,765.00	137,866.48	194,500.00	2,770,712.18	11,344,689.43	2,426,022.75	2,186,799.92
1933	1,860,325.00	75,100.00	184,000.00	2,361,138.96	12,475,895.41	1,885,243.55	1,710,949.42
1934	1,574,300.00	50,230.00	17,000.00	1,872,586.04	13,397,131.28	1,475,454.76	1,254,846.72
1935	1,293,959.07	50,000.00	126,513.10	1,520,472.17	14,34,154.47	1,486,317.70	1,349,490.11
1936	1,970,311.00	69,500.00	47,570.00	2,114,966.51	15,14,074.34	2,100,892.17	2,052,751.87
1937	2,083,200.00	69,000.00	73,000.00	2,237,812.45	16,8,700.66	2,229,111.70	2,161,472.73
1938	2,272,720.24	83,000.00	62,300.00	2,421,985.69	17,59,920.71	2,362,064.98	2,286,858.06
1939	2,892,880.01	88,700.00	96,650.00	3,086,719.30	18,77,198.05	3,009,521.25	2,480,485.06
1940	2,980,498.88	93,200.00	100,000.00	3,187,330.29	19,106,925.87	3,080,404.42	2,946,170.44
1941	3,952,400.95	91,290.00	2,219,400.00	6,269,590.95	21,1,059,240.11	5,200,350.84	5,111,010.54
1942	8,961,686.00	97,490.00	1,835,342.00	10,894,518.00	21,1,760,578.00	9,133,940.00	7,210,643.00
1943	12,525,365.00	106,450.00	4,910,700.00	18,653,246.00	-----	-----	14,300,227.00

Includes printing and binding, stationery, and contingent funds.

Includes proceeds from sales of residue gas.

Service items include Government fuel yards, helium, and other investigations and services for other departments.

Includes gas investigations for War Department.

Includes \$1,586,388 for Government fuel yards.

Includes War Minerals Relief Commission, \$8,500,000.

Includes \$719,476.67 unexpended balance reappropriated.

Includes \$120,216.38 unexpended balance reappropriated.

Includes \$102,354.19 unexpended balance reappropriated.

Includes \$159,580.70 unexpended balance reappropriated.

Includes \$241,713.96 unexpended balance reappropriated.

Includes \$231,056.04 unexpended balance reappropriated.

Includes \$50,000 unexpended balance reappropriated.

Includes \$27,585.51 unexpended balance reappropriated.

Includes \$2,612.45 unexpended balance reappropriated.

Includes \$3,965.45 unexpended balance reappropriated.

Includes \$8,399.29 unexpended balance reappropriated, and balance of \$35,544.39 receipts from sale of

ium and other products.

Includes \$13,541.41 unexpended balance reappropriated, and balance of \$58,822.55 receipts from sale of

ium and other products.

Includes \$6,000 unexpended balance reappropriated, and balance of \$85,452.95 receipts from sale of

ium and other products.

Includes \$934,013.68 balance reappropriated, and balance of \$87,431.51 receipts from sale of helium and

er products.

Includes \$1,229,937 balance reappropriated and balance of \$128,019 receipts from sale of helium and

er products.

Estimated.

TABLE 2.—Bureau of Mines expenditures, fiscal year 1942

Branch or division	General expenses	Operating and rescue cars and stations and investigation of accidents	Testing fuel	Mineral mining investigations	Oil and gas investigations	Expenditures mining experiment stations	Economies of mineral industries	Care, etc., buildings and grounds, Pittsburgh, Pa.	Production of alumina from low-grade bauxite and alunite	Helium plants and investigations	Investigation of domestic sources of mineral supply	Manganese beneficiation pilot plants	Construction and equipment of helium plants	Coal mine inspections and investigations	Investigation of bauxite and alunite ores and alum clays deposits
Office of the Director.....	\$11,717	\$556				\$66					\$391				
Office of the Assistant to the Director.....	4,938					45									
Office of Current Information.....		2,131												\$12,022	
Total.....	16,675	2,687				111					391			12,022	
Administrative Branch:															
Office Administration Division.....	47,912	15,597	\$1,396		\$2,661	2,775	\$13,520		\$2,059	\$3,156	15,084	\$16,908	\$3,807	20,381	\$9,037
Information Division.....	1,503	15,166	12,498	\$9,518	8,687	19,230	5,490			6,410	9,194	2,619	772	3,230	253
Total.....	49,415	30,763	13,894	9,518	11,348	22,005	19,010		2,059	9,566	24,278	19,527	4,579	23,611	9,290
Technologic Branch:															
Coal Division.....		99,559	270,680					\$109,247							
Explosives Division.....		98,220												29,135	
Metallurgical Division.....				269,759		220,608		7,104			105,094	1,438,136			124,513
Mining Division.....		50,030	6,042	120,553		6,042			75,522		805,330			6,401	16,559
Nonmetals Division.....						301,160									
Petroleum and Natural Gas Division.....					308,197					435,434			1,205,421		
Principal Mineral Technologist.....				15,836											
Total.....		247,809	270,680	406,148	308,197	527,810		109,247	82,626	435,434	910,424	1,438,136	1,205,421	35,536	141,072
Economics Branch:															
Coal Economics Division.....							36,698								
Foreign Mineral Division.....							71,916								
Metal Economics Division.....							115,324								

TABLE 2.—Bureau of Mines expenditures, fiscal year 1942—Continued

Branch or division	Investi- gations and re- search on processes for pro- duction of potas- sium car- bonate and sodium carbonate from irona and wy- omingite rock	Electric furnace labora- tory building, Norris, Tenn.	Investi- gations of raw material resources for west- ern steel produc- tion	Helium produc- tion	Mainte- nance, Bureau of Ships	Expedi- ting pro- duction of equip- ment and supplies	Protec- tion of mineral resources and fa- cilities	Salaries and ex- penses, Office for Emergency Management (transfer)	Emer- gency fund for the President (transfer)	Develop- ment and operation of helium proper- ties (special fund)	Working funds	Printing and binding	Conti- nent ex- penses	Totals
Office of the Director														\$12,730
Office of the Assistant to the Director	\$2,812 427													5,003 14,153
Office of Current Information														51,886
Total	3,239													
Administrative Branch:														
Office Administration Di- vision	\$2,812 427			\$8,856 1,123	\$3,605 4,480				\$13,185 9,448	\$1,450	\$122	\$8,089 3,900	\$7,133	200,023 114,130
Information Division				9,979	8,085				22,633	1,450	122	12,649	7,133	314,153
Total	3,239			9,979	8,085				22,633	1,450	122	12,649	7,133	314,153
Technologic Branch:														
Coal Division														
Explosives Division			1,344						19,502			14,417		543,884
Metallurgical Division									27,171		341,206	370		466,067
Mining Division					\$5,710	\$303,102					3,656	5,459		2,352,918
Nonmetals Division			300,582			105,093						4,296		1,530,200
Petroleum and Natural Gas Division	28,198	\$9,924										1,035		1,432,398
Principal Mineral Technol- ogist				202,915						55,847		1,116		2,208,930
Total	28,198	9,924	301,926	202,915	5,710	408,195		1,770	46,673	55,847	344,862	26,663		7,551,223

Bituminous Coal Division

DAN H. WHEELER, Director

[HE attack on Pearl Harbor found the bituminous coal producing industry, with its markets stabilized under the Bituminous Coal Act of 1937, in the soundest condition in many years to meet its wartime responsibility as the Nation's principal source of fuel.

It found in the Bituminous Coal Division, the administrator of this war, a central source of statistics and other information and technical assistance readily available to the Government in taking steps to protect the soft-coal supply.

In addition to regulating the coal markets to help the producing industry keep itself in a sound condition, the Division since the war has become one of the primary aids of the Office of Solid Fuels Coordinator for War. Also, it is assisting the Office of Price Administration in maintaining an anti-inflationary ceiling over soft-coal prices, and is serving as the principal source of statistics and, in many instances, providing technical advice for the various other governmental agencies concerned with problems relating to the fuel supply.

Industry Strengthened

A little more than a year prior to the attack upon the United States, the bituminous coal producing industry, with the establishment of minimum prices and marketing rules and regulations on October 1, 1940, had emerged from nearly two decades of savage, competitive warfare that had financially drained and seriously weakened it. The year and three months of market stability which the industry had enjoyed under Coal Act regulation had given it an opportunity to repair much of the damage of the years of chaos before it plunged into the job of meeting wartime fuel demands.

Decisive battles are fought on the industrial front, and fuel is vital ammunition in this modern age of highly developed industrial organization and mechanical warfare. Bituminous coal is the Nation's principal fuel. The head start which the soft coal industry had in

rehabilitating itself, and the continuation of the stabilization of its markets under the Coal Act, are major contributions toward assuring an adequate supply of this fuel for war needs.

Prior to the war, soft coal provided approximately 75 percent of the power for manufacturing, 80 percent of that for railway locomotives, and about 70 percent of that for steam-generated electricity. Also, it was the most common fuel for homes, and the source of raw materials for many essential military and civilian materials, such as explosives, artificial silk and rubber, medicines, plastics, paints, and chemicals. Now that the war is reducing the availability of other fuels in certain areas of the United States and Canada, coal must carry a still greater share of the fuel burden.

Aids Planning Coal Supply

Planning and protection of an adequate coal supply in time of war is one of the most important governmental functions correlated with its actual military operations. The industries that mine and transport this fuel require much labor and large quantities of strategical materials. They are constantly exposed to the disruptive forces set loose by world conflict, and careful thought and constant vigilance are necessary to keep coal moving in required quantities from the mines to consumers.

In requesting the Secretary of the Interior to act as solid fuels coordinator to protect the fuel supply, President Roosevelt, in his letter of November 5, 1941, stated:

As the defense effort progresses it will become increasingly urgent to assure that the supply of solid fuels will be adequate and that they will be readily available at consuming points when required for military, industrial, and civilian purposes. Difficult problems are already arising with respect to their supply and availability for such uses. These problems require the efficient and careful coordinated development, production, distribution, utilization, transportation, and handling of solid fuels.

You have in your Department extensive information and facilities with respect to solid fuels. I refer particularly to the Bituminous Coal Division, the Bureau of Mines, and the Geological Survey. In addition, in your capacity as Petroleum Coordinator for National Defense you have important functions with respect to oil and gas. It is essential that the handling of solid fuel and of oil and gas problems should be closely coordinated in the present emergency.

Immediate Action Made Possible

Rather than to organize a large staff to carry on the work of coordinating the soft-coal supply, the facilities of the Bituminous Coal Division were made available for that purpose. Additions were made to the Division where necessary to accommodate the additional duties entailed by the Solid Fuels work. A great deal of information per-

ing to the production, transportation, distribution, storage, and assumption of soft coal, compiled primarily for use in the regulation coal markets, was made immediately available to the Solid Fuels Office. In addition to this, a well-trained staff of technical employees was placed at the disposal of that Office. This saved a great deal of valuable time and a substantial amount of money, and it materially expedited the work of protecting the Nation's coal supply.

With this assistance, the Office of Solid Fuels Coordinator for War was enabled to launch immediately a program to aid the coal and transportation industries and fuel consumers to take wartime precautions. This program included steps to stimulate consumers to increase their stocks of coal while the fuel was readily available as protection against possible emergencies; to keep coal moving in heavy volume during the off-season to avoid loss of the use of limited labor and equipment; to aid producers in obtaining priorities to obtain rationed equipment and materials; to help the coal industry establish emergency arrangements to counteract the loss of regular coal transportation facilities due to wartime disruptions, and other actions in connection with planning and maintaining an adequate coal supply.

Additional Data Necessary

Although the information readily available in the Division made it possible for the Solid Fuels Office to begin effective work at once, and planning required the compilation of much additional data to meet problems peculiar to the wartime coal supply. Much of the information had been compiled in shape designed particularly for market regulatory purposes, and had to be revised and brought up to date to be adequate for use by the Solid Fuels Office.

For instance, information available from mine invoices showed each mine's shipments of particular kinds, qualities, and sizes of coal during recent years, thus giving some indication of the mine's past ability to produce. Other information was available which shed still more light on mine capacity. But the available data left too much to guesswork in estimating the Nation's capacity for producing and shipping the various kinds, qualities, and sizes of coal with the degree of accuracy necessary in wartime.

With the aid of the Bituminous Coal Producers' Boards, the Division, at the request of the Solid Fuels Office, began a more adequate survey of actual and potential mine capacity; the first to be made in recent times. The Producer's Boards are comprised of the elected representatives of the producers in each district, and represent the industry in participation in the administration of the Coal Act. They have intimate contact with the mines in their respective districts. At the close of the fiscal year, this survey was well under way and

already was providing useful information, although it was not complete, due to the large number of mines to be covered.

Early in the war it became manifest that the draft, enlistments, and the loss of men to other industries were having a substantial effect in reducing the labor supply available to the coal industry. Some producers reported that their production was being severely hampered, particularly by the loss of keymen. The Division was requested by the Solid Fuels Advisory War Council, a wartime industry-public advisory body on coal and coke problems, to make a study of the effect of the war on mine labor. This study showed that the mining industry had lost 48,439¹ men as of March 31, 1942, because of war reasons.² Appeals were made by industry and the Solid Fuels Office to Selective Service authorities to help protect the supply of mine labor.

It became apparent that the rubber shortage would have a substantial effect upon the coal supply that would require planning to counteract. The Division studied the over-all effects of the rubber situation, to provide information as required. It was found that approximately 50 million tons of soft coal per year move from the mines to consumers in motor trucks.

Coal Stocking Program Aided

Statistics compiled by the Division showed that all during the spring of 1942, coal was flowing into consumers' storage piles in great amounts, in response to the program operated by the Solid Fuels Office in conjunction with other agencies of the Government and the coal and transportation industries. But, the available figures indicated that a great many individual consumers, including many important war industries, were failing to take adequate precautionary measures. To probe this situation accurately, the War Production Board and the Solid Fuels Office undertook, with the Division's help, a plant-by-plant survey of the precautions being taken by prime war industries and the railroads.

The investigation bore out what previous information had indicated. Many industries were not taking adequate precautions. These were searched out, and the Division was engaged in preparing notices warning the individual plants of their situation, which were to be sent out by the Solid Fuels Office.

At the request of the Solid Fuels Office, the Division investigates and makes recommendations upon applications by coal producers for priority ratings to obtain materials and supplies for expanding or

¹ This figure was computed on 80 percent of the tonnage. Projected to cover 100 percent of the industry, it would indicate a loss of 60,549 men. Due to recruitment, the net shortage of men was computed at 33,765 as of Mar. 31, 1942.

² Entering military service, shifting to other industries, and because of inadequate transportation.

rehabilitating mine production facilities. Such applications are referred to the Solid Fuels Office by the War Production Board for advice before acting upon them.

Also, the Division investigates and makes recommendations to the Solid Fuels Office regarding applications for necessity certificates in connection with income-tax deductions sought under section 124 of the Internal Revenue Code which provides for amortization within 5 years of the cost of expanding plant facilities for the production of goods essential to the war program.

The Division has furnished technical personnel which is engaged currently in assisting preparation of details of an emergency coal distribution program for the Office of Solid Fuels Coordinator for War. All the information in the Division's records, needed in preparing the program, has been made available to the Solid Fuels Office. The program will be put into effect only if the coal supply system breaks down under the stress of war pressure and shortages threaten to impede operations of essential war plants or to cause civilian suffering.

Maximum Coal Price Regulation

Approval of the Emergency Price Control Act of 1942 on January 30 opened a new field for the Division's participation in prosecution of the Nation's coordinated war effort. Through an exchange of letters between Secretary Ickes and Price Administrator Leon Henderson, the groundwork was laid for cooperation between the Division and the Office of Price Administrator in taking steps necessary to prevent war-time inflationary prices for bituminous coal.

Accordingly, a plan was developed whereby the Division recommends to the Price Administrator suitable action under powers vested in his office by the Emergency Price Control Act with reference to control of maximum bituminous coal prices charged by producers, distributors, and sales agents. The plan was devised under section 201 (a) of the Price Control Act, which provides that the Price Administrator may utilize the services of other Federal agencies in administering the act. In order to discharge its recommendatory function, the Division was empowered to conduct hearings, conferences, and handle necessary correspondence.

The first fruits of this cooperative arrangement was establishment of Maximum Price Regulation No. 120, setting up maximum prices for producers, sales agents, and distributors on deliveries from mines and preparation plants. Participation of the Division in its establishment is described in the regulation itself, as follows:

At the request of the Price Administrator the Bituminous Coal Division, United States Department of the Interior, has cooperated with the Price Administrator in the formulation of the maximum prices established by this regulation in accord-

ance with the arrangement effectuated by the letters dated March 9 and 13, exchanged between the Price Administrator and the Secretary of Interior.

As in the case of its cooperation with the Office of Solid Fuels Coordinator, the Coal Division was exceptionally well prepared to aid the Price Administrator in setting up maximum bituminous coal prices.

This was due, in a measure, to the fact that the Coal Division, at the time the Emergency Price Control Act was approved, had before it Docket No. A-983. This was a proceeding instituted on application of the Bituminous Coal Consumers' Counsel seeking establishment of maximum prices under provisions of the Bituminous Coal Act. The Acting Director ruled continuation of these proceedings was unnecessary, but instructed the Division staff to proceed with a careful study of all materials presented and filed.

OPA Aided By Division

These and other voluminous data in the Division files concerning costs of production and invoice prices were made available for use in formulating the maximum prices established under Regulation No. 120. The regulation itself leans heavily upon the size groupings and classifications set up in the minimum price schedules established by the Coal Division, and the minimum price schedules lent a systematic pattern for formulation of a readily comprehensible set of maximum prices for coal delivered from the mine. In addition, Regulation No. 120 contains many provisions designed to assure that the maximum price regulation will be consistent with the minimum prices and marketing rules and regulations.

In addition, the Division was consulted in respect to Maximum Price Regulation No. 122, which governs bituminous coal delivered from docks, yards, and terminal facilities. In connection with this regulation, Division technicians made two studies: One concerned the interrelationship between Regulation 120 and 122. The other dealt with the interrelationship between Regulation 122 and Bituminous Coal Division regulation over minimum prices and marketing rules and regulations applicable to distributors, including dock operators. Various suggestions offered by the Division were utilized in the final form of the regulation.

It was upon advice of the Division that OPA granted a request from the War Department that Alaska be deleted from the maximum price schedule.

Division Investigates Violations

However, the responsibility of the Bituminous Coal Division in prevention of wartime inflationary bituminous coal prices is not dis-

charged merely by furnishing the Price Administrator with economic data and technical advice on the bituminous coal industry. In the agreement between the Secretary of the Interior and the Price Administrator the task of detecting and investigating violations of Maximum Price Regulation No. 120 was assigned to the Division.

This arrangement, including recommendations to OPA as to the application of appropriate measures, was consummated because the Division had a compliance staff with the specialized training needed for the task. The arrangement likewise obviated the possibility of overlapping activities by the two Federal agencies. As the fiscal year concluded, this additional and important work had been assumed by a compliance staff fully aware of the extensiveness of the undertaking. As of June 30, 1942, there were 186 cases involving violations of Maximum Price Regulation No. 120 under investigation by the Division.

Division Recommends Amendments of Maximums to OPA

Still another important task devolves upon the Division in connection with establishment, enforcement, and maintenance of wartime maximum bituminous coal prices for mine shipments. It is called upon to consider and make recommendations concerning the many requests for relief by way of adjustment, exception, or amendment from the maximum prices or accompanying regulations.

These requests for relief from persons affected by the regulation, are made in petitions or protests filed in accordance with Procedural Regulation No. 1 of the Office of Price Administration. When filed with OPA, the protests or petitions are docketed and referred to the Division where they are processed and analyzed in the light of data available to the Division and the coal needs of the Nation.

On the basis of such study the Division recommends to the Office of Price Administration the disposition it believes should be made of the petition or protest.

Cooperation With Other Agencies

With the advent of war, the Division, in addition to duties imposed by statute or arrangement, has developed a highly important function as a service unit for other war agencies and departments of the Government. This is especially true of the relationship between the Division and the Departments of War and Navy, the War Production Board and its various subdivisions.

The Under Secretary of War, the Quartermaster General, and other high officials of the War Department and of the Navy Department as well, have frequently sought from the Division, especially the Mar-

keting Branch, its technical advice and assistance. Many of their problems concerned availability of coal of various types for Army and Navy concentrations, its qualitative value, price at the mines, freight rates, and other questions of supply.

Because of the threatened shortage of other fuels, the War and Navy Departments have urged use of coal for power upon many plants being constructed for war goods production. The Departments have called upon the Marketing Branch to recommend sites for these plants with reference to readily available supplies of suitable coal.

The problems upon which technical advice has been sought and received from the Division went farther afield than coal availability. For example, they include such diversified matters as discussions with War Production Board officials on proper coals for steel making and with the Chemical Warfare Service on properties of fly ash. Explosive plants, arsenals, the Treasury Department, the Post Office Department, Rural Electrification and the Interstate Commerce Commission are among other Government agencies which the Division has supplied with technical information.

The Division has granted a request advocated by the Consumers Counsel that the War Department temporarily be exempted from a marketing rule that requires purchasers to pay interest on past-due transportation charges prepaid on coal shipments by code member producers and registered distributors. At the request of the War Department the Division likewise facilitated establishment of new transportation facilities for war materials from the Huntsville Arsenal. This was done by establishing minimum prices to permit shipment of coal in barges via the Tennessee river from "truck mines" in the Tennessee-Georgia field. This action was sought by the War Department chiefly to render feasible development of interrelated barge shipments of coal and other raw products to, and the processed goods from, the Huntsville Arsenal and a nearby Army fabricating plant.

Administration of Regulatory Functions

The Bituminous Coal Act of 1937 was designed to free one of the Nation's most vital industries from a savage competitive warfare which was rapidly dissipating its \$2,500,000,000 investment, plunging many of its 500,000 miners into dire poverty, impoverishing entire sections of the country, and causing serious dislocations in the whole economy of the country.

These grievous conditions did not arise overnight. They stemmed largely from World War I which saw a vast expansion in the productive capacity of the bituminous mines. This was due partly to increased fuel requirements for war goods manufacture. In part it was due to attempts to make up deficiencies of supplies at various points of consumption caused by transportation shortages.

After the war, however, demand and potential supply were thrown far out of adjustment. Although manufacturing remained at a high peak, demand for bituminous coal lessened year by year. This situation was caused by increased efficiency in the use of coal coupled with growing competition from other fuels.

The excess capacity created by lessened demand led to lowered prices which were often below the cost of production. Producers sold their coal for what they could get in the wholly human hope of "weathering through" until markets improved.

In consequence, the era of prosperity enjoyed by other industries from 1923 to 1929 found a sad contrast in the bituminous coal industry. They were years of mounting losses to coal producers, which were heightened in the depression years which followed. In 1929 the industry produced 525,000,000 tons of coal but suffered a net loss of \$11,822,033. In 1932 the net loss was \$51,167,000.

Need of Regulation Obvious

It became obvious that in the absence of some regulation the Nation soon would lose its chief source of energy or find it controlled by the few financially able to survive the destructive competitive price war.

To obviate what threatened to be a major blow to American industry, the Congress enacted a statute under which are established minimum prices designed to return to producers a realization which approximates the weighted average costs in their respective areas.

The law established the framework of a public policy within which the industry could function efficiently in the interests of the producers, miners, and the consuming public. This was the objective of the coal act, rather than any attempt at coercive interference with coal producers. The Supreme Court, in an opinion holding the act constitutional said, "The history of the bituminous coal industry is written in blood as well as in ink . . . If the strategic character of this industry in our economy and the chaotic conditions which have prevailed in it do not justify legislation, it is difficult to imagine what would."

Providentially these "chaotic conditions" were removed by the operation of the act long enough in advance of America's full swing into the war to permit producers to strengthen themselves sufficiently financially to undertake the all-out production demanded. They likewise were able to throw their resources into production with the comforting assurance that the minimum price structure would provide them realization on sales at least approximately equal to weighted production costs and protect them against price cutting.

In addition to the benefit of stabilization through operation of minimum price schedules, the industry has enjoyed in many markets increased consumer requirements for coal and consequent price in-

creases for certain grades and sizes because of the huge war goods manufacturing program.

Regulatory Structure Still Required

Wartime price improvement is not regarded by Division economists and marketing experts as any valid reason for relaxation of the market regulatory structure which brought about and is maintaining stabilization.

Statistical studies made during the fiscal year showed that some coal still was competing in various markets at prices close to the minima established under the act. The obvious inference was that this competition would have resulted in prices for this coal which were below the cost of production, in the absence of any regulatory structure. In addition, there are certain competitive factors peculiar to, and variables inherent in the coal industry which often act as disturbing forces on parts of the market when there is a rising demand in another. The only effective control over these factors ever devised is minimum price schedules.

For instance, requirements are never uniform through the range of sizes and qualities of coal. The mine owner, in producing the size for which there is need often must, of necessity, produce sizes for which there is little or no requirement. Since it is generally economically unfeasible to maintain storage at mines, the slower moving sizes are loaded into whatever cars are available where they clog up tracks and hamper movement of sizes for which there is a ready sale. Until establishment of minimum price schedules it had been the historic custom of the coal industry to dump this coal at any price obtainable, regardless of production costs. However, what was a "dumped" size for one producer may have been a major size for another so that in the maze of sales the price level was influenced strongly by the quotations on the distressed residuals. With transportation facilities dwindling day by day and requirements centering more and more on industrial sizes, it is obvious that this dumping practice would be resumed upon any relaxation of the act's regulatory features.

Fluctuations in Production

One of the variables with which the coal industry must contend is low production in the summer season. This may be illustrated by observing the 3 years of 1936, 1938, and 1940. During each of these 3 years production was not seriously interrupted by stoppages due to strikes. Considering the average monthly production in these 3 years as 100 percent, the average January production in the United States was 113 percent, while the average April production was 83 percent,

with averages for May and June at about the same level as April. The average December production was 121 percent. Low summer production was most marked in District 14 (Arkansas-Oklahoma) where the average January production was 183 percent, with the averages for April and May being 23 and 24 percent, respectively.

Another variable is week by week production in any season. For example, the production of the week ended July 5, 1941, was only 61.2 percent that of the previous week and only 70.9 percent that of the following. Production for the week ended September 20, 1941, was 90 percent that of the previous week and 90.7 percent that of the following. With both winter and the war effort in full swing, production for the week ended January 3, 1942, was only 88.7 percent that of the following week.

It is obvious that such extreme fluctuations in production result in periodic surpluses. It is a fair assumption that, in the absence of minimum price schedules, these surpluses would be disposed of by the price cutting technique which brought about the chaotic conditions from which the industry suffered for more than two decades.

The history of the bituminous coal industry, "written in blood as well as in ink," records its plunge into chaos when its economy was disrupted by the cataclysm of World War I. The bituminous coal industry, however, has in the Bituminous Coal Act of 1937 a tested bulwark to protect it now and in the approaching period of reconstruction against such a buffeting as it suffered as a result of the last war.

Adjustment of Minimum Prices

The period covered by this report saw the conclusion of the first phase of a proceeding, designated as General Docket 21,³ instituted by the Division to determine whether or not production costs had changed sufficiently to make appropriate a general revision of minimum price schedules. Adjustment of effective minimum prices is required by the statute whenever it is determined that the weighted average costs of the producing industry have changed in excess of 2 cents per ton in any minimum price area.

The first phase of the proceeding dealt solely with determination of cost changes in various price areas throughout the Nation. The Acting Director issued determinations that costs had increased in virtually all minimum price areas and that the weighted average increase for the Nation was 10.63 cents a ton. The findings were reviewed and affirmed by Secretary of the Interior Ickes, whereupon

³ Since the conclusion of the fiscal year, Trial Examiner Floyd McGown, who heard the proceeding, made his report and recommendations to Acting Director Dan H. Wheeler of the Bituminous Coal Division. Acting Director Wheeler received briefs, heard oral arguments, and on Aug. 28, 1942, issued an order, effective Oct. 1, 1942, establishing minimum prices which represented increases in minimums of 5 to 30 cents for various designated areas.

the second phase of the proceeding was initiated. The second phase looked toward revision of minimum price schedules as required by the statute in view of the change in costs, and was still in process at the close of the fiscal year.

Aside from changes in the costs used in formulating minimum prices, there are constant changes in other factors affecting the marketing of coal that require constant adjustments to minimum price schedules and marketing rules and regulations. To make possible the maintenance of the regulatory structure on a sound basis, the Congress expressly provided for ready adjustment in section 4 II (d) of the Bituminous Coal Act. It authorizes the filing with the Division of petitions seeking modification of the effective minimum price schedules and the Marketing Rules and Regulations. Code members, district boards, the Bituminous Coal Consumers' Counsel, and governmental subdivisions have availed themselves freely of this privilege of petition.

Price Adjustment Petitions Lessen

In the 9 months elapsing between establishment of minimum price schedules and Marketing Rules and Regulations on October 1, 1940, and June 30, 1941, 944 petitions were filed under this section. They sought either supplementation or revision of effective minimum price schedules and Marketing Rules and Regulations. During the entire fiscal year ended June 30, 1942, only 572 petitions were filed. The majority of these were requests for the establishment of minimum prices for new mines, additional minimum prices for new sizes produced by old mines, additional minimum prices for rail shipments from mines which had formerly shipped only by truck, and new or additional loading points for mines already shipping by rail. Thus it may be seen that the majority of petitions stemmed from developments in business rather than objection to minimum prices already established.

Of the 1,516 petitions filed from October 1, 1940, to June 30, 1942, all but 10 had been acted upon in an appropriate manner by the latter date and 909 had been disposed of finally by order or memorandum.

When numerous petitions were filed for adjustment of the complex price structure immediately after establishment of minimum prices and Marketing Rules and Regulations in October 1940, the Coal Division deemed it necessary to give full opportunity to all parties to present evidence concerning their complaints. Hearings were held in virtually all 4 II (d) proceedings except when the parties interested waived them. As a result of those hearings, the Coal Division has devised appropriate methods for expediting adjustment of established price structure to reflect the continual changes in the coal industry. It is now possible to curtail greatly the number of hearings.

Requests for the establishment of new prices for new mines, for revisions in established prices, for establishment of new prices for newly prepared sizes at old mines, for establishment of new loading points, have been ruled on when possible without formality of oral hearings. On the basis of affidavits from petitioners and others interested in such cases, the Coal Division has endeavored to dispose of requests for adjustment by orders granting temporary relief. These orders provide conditionally for final relief to become effective 60 days from the date of the order. Wide opportunity is given anyone interested to object and be heard. Thus in 568 out of the 1,516 proceedings conducted under section 4 II (d) such temporary and conditionally final orders were issued.

River Transportation Problem

Several proceedings have arisen which involve controversial problems arising out of the river transportation of coal in relation to coal transported by railroad or other means. Among them is one affecting the Cincinnati, Ohio, market area, which still was pending at the end of the fiscal year. The Cincinnati area consumes annually approximately one and a half million tons of coal shipped via the Ohio River and one and a half million tons of coal shipped by rail, largely from the high volatile producing field in District No. 8. In view of the many complaints particularly from retailer dealers and retail dealer associations in Cincinnati, the Coal Division, in January 1942, initiated a proceeding, known as Docket No. A-1239, in order to determine the exact nature of the problems affecting the Cincinnati area insofar as the shipment of bituminous coal and resale of such coal in that area were concerned, and looking toward a solution. The hearing in that proceeding lasted for approximately 8 weeks, when, because of the difficulty in procuring cost figures from producers shipping by river and from retail dealers allegedly adversely affected by the minimum prices established by the Division, the hearing was temporarily adjourned. The failure of several persons to produce materials required under a subpoena issued by the Acting Director made necessary the institution of a court proceeding, which is still pending. As a result of initiation of the court action, however, negotiations have been conducted with the persons affected with a view toward procuring the necessary cost material without recourse to a court order.

Compliance Under Coal Act

To an extent as great as possible with the limitations of the staff available, the Division has checked carefully the market activities of

companies subject to the Bituminous Coal Act to prevent violations of minimum prices, the Marketing Rules and Regulations and orders. A review of the numerous checks leads to the conclusion that the pledges of compliance have been kept faithfully by the preponderance of the industry and that the disastrous marketing conditions and practices which the Congress desired to prevent have been eliminated.

However, the magnitude of the task of checking compliance can be appreciated only on the basis of full knowledge of the various channels and methods used in marketing bituminous coal, the standardized nature of the product, and of the multiplicity of trade practices formerly prevalent in the industry. The scope of the undertaking may be indicated, however, by noting that bituminous coal is sold by more than 17,000 companies or individuals, while producers, sales agents, or distributors have agreed to observe the regulations.

It is reasonable to assume that under less favorable market conditions than those prevalent during this fiscal year there may have existed a greater incentive to sell coal at less than the minimum price and engage in unfair methods of competition.

The general conclusion, that for the most part, compliance pledges were kept faithfully is not meant to indicate a condition approaching total absence of violations. Despite the upward trend of prices generally, great quantities of bituminous coal have competed in the market at prices approximating the minimum. As might be expected, this has been particularly true of low grade coals. Such competition also results from the inability of the mine operators to produce particular sizes of coal in a volume proportionate to market demand for those sizes without also producing residuals for which at times there is no corresponding demand. The compliance staff, with the cooperation of the District Boards, has uncovered numerous instances of violation as a result of these conditions and the sanctions provided in the act and the regulations have been imposed on violators.

Penalties provided for producers include the revocation of membership in the code with a condition of restoration being the payment of a tax of 39 percent of the sale or minimum price to the United States Treasurer, or else orders directing the producer to cease and desist from further violations. Applications may be made by the Division to the Circuit Court of Appeals of the United States to enforce such orders. The penalty provided for distributors, acting as such when purporting to act as sales agencies, is suspension or revocation of their registration thereby depriving them of the privilege of receiving a discount from the minimum price when purchasing coal from the producer.

Procedure in Violation Cases

When checks of records of companies disclose what seems to be wilful violations, steps are taken to set such matters for hearing. If evidence and testimony at the hearings lead to the conclusion that wilful violations have been committed, appropriate orders are issued imposing the sanctions.

During the fiscal year 829 such investigations have been completed, 13 hearings have been held and 232 orders imposing the penalties under the act and rules and regulations have been issued. Of these orders 103 directed producers to cease and desist from further violations; 95 revoked the code membership of producers, the restoration of which was conditional upon the payment of taxes ranging from moderate sums up to \$12,000.14 and totaling \$89,072.41; 29 suspended the registration of distributors from 30 days to 9 months and 10 revoked the registration of distributors.

Of the 232 compliance orders, 35 were entered without formal hearing pursuant to the Division's procedure under which compliance proceedings may be disposed of without formal hearing on the basis of an application filed by the alleged violator. At the close of the fiscal year 497 investigations were in process and 122 hearings had been held as a result of which final orders had been entered.

A great many investigations disclosed violations which did not seem to be wilful or circumstances which made it inadvisable to institute formal compliance proceedings. In such cases the Division usually disposed of the matters informally. Often it required sales agents and distributors to render corrected invoices for the full minimum price or required sales agents and distributors to refund unlawful allowances received by them from producers.

Litigation

Only two important court decisions were rendered during the year directly affecting the Coal Division. One of these, a decision by the United States Supreme Court, is regarded as a milestone in the field of judicial review of administrative adjudications.

Seaboard Air Line Case

On December 15, 1941, the Supreme Court, with three justices dissenting, rendered its opinion in *H. A. Gray et al. v. Legh R. Powell, et al.* No. 18, October Term, 1941, reversing the Circuit Court of Appeals for the Fourth Circuit and upholding the Division's order denying the Seaboard Air Line's petition for exemption from mini-

imum price regulation.⁴ The railroad had contended that under section 4 II (1) of the coal act exempting coal consumed by the producer thereof, it was entitled to an exemption in the situation where it had leased coal lands and entered into agreements with three independent contractors to mine coal for petitioners. In upholding the Division's order the Supreme Court stated the determination of who is the "producer" is a matter for the expert and informed judgment of the body entrusted with the administration of the act.

The Midland Cooperative Case

The Director's interpretation of the unfair trade practice provision of the act was upheld in all respects by the Circuit Court of Appeals for the Eighth Circuit in *Midland Cooperative Wholesale v. Harold L. Ickes and H. A. Gray*, No. 12,085, November Term, 1941.

The case was instituted by a petition filed by Midland Cooperative Wholesale to review an order of the Director which held that the Midland Co. could qualify to receive discounts from the minimum prices only with respect to that coal which it purchased for resale to bona fide and legitimate farmers' cooperatives. Petitioner, however, contended that (1) the permission granted to "farmers' cooperatives" in the last paragraph of section 4 II (i) of the act was intended by the Congress to be extended to all types of cooperative organizations and (2) that the distribution by it of patronage dividends did not disenable it from qualifying as a distributor.

In an opinion in which the Division's brief is quoted at length, the court ruled that the Director was correct in ruling that Congress had not intended to extend to consumer cooperatives the same privileges it had extended to farmers' cooperatives. It also ruled that the Director had correctly found that petitioner could not qualify as a distributor since in its capacity as a "purchasing agent" for those of its member associations which were not farmers' cooperatives, it was an "instrumentality of retailers" within the meaning of paragraph 12 of section 4 II (i) of the act and was therefore prohibited from receiving discounts from the established minimum prices.

Petitioner's request for certiorari was denied by the Supreme Court on April 27, 1942.

Miscellaneous

On November 28, 1941, Wheeling Valley Coal Corporation, et al., code members in District No. 6, filed a petition with the Circuit Court of Appeals for the Fourth Circuit to review an order of the Director

⁴ The decision was rendered as a result of a reargument of the case before the court, the court having previously (Mar. 31, 1941) by an evenly-divided vote upheld the decision of the Circuit Court of Appeals for the Fourth Circuit.

which denied the request to establish special "ex-river" prices on shipments of coal to certain northern Ohio market areas. Subsequently petitioners filed a motion for leave to apply to the Division to reopen the matter before it. The court granted such leave and petitioners on July 24, 1942, after filing a petition to reopen the cause with the Division pursuant to leave of the Division, filed a motion to dismiss its petition with the court.

On January 26, 1942, the Circuit Court of Appeals for the Seventh Circuit granted the Division permission to intervene in the case of *Bell & Zoller Coal Co. v. Wilson & Co., Inc.*, a proceeding instituted by the Bell & Zoller Coal Co., a code member, to recover the difference between the minimum price and the contract price for certain coal shipped after October 1, 1940, pursuant to a contract entered into prior thereto which provided for a sale price below that established as the minimum price. In resisting payment, the defendant contended that the price provisions of the act could not lawfully be made applicable to coal moving wholly within the State of Illinois and attacked the validity of an order entered earlier by the National Bituminous Coal Commission ruling that all commerce in bituminous coal within Illinois directly affects interstate commerce.⁵

On March 4, 1942, a suit was filed in the Circuit Court of Appeals for the Sixth Circuit by Edwin R. Eberhart, a code member, to review an order entered by the Acting Director revoking and canceling Eberhart's code membership and for a stay of the effective date of that order. The court first granted the stay and thereafter, upon motion of the Division, modified the stay order by adding a condition that pending final disposition of the petition for review, Eberhart was not to sell coal in violation of the price requirements of the act. On May 6, 1942, the court, acting on stipulation of counsel, dismissed the proceeding and vacated the stay order.⁶

On May 19, 1942, the city of Indianapolis filed with the Circuit Court of Appeals for the Seventh Circuit a petition to review an order of the Acting Director denying the city an exemption from the act with respect to the mining operations of its wholly-owned subsidiary, Milburn By-Products Co. Petitioner's request for a stay of the Acting Director's order was denied by the court but the case has not yet been considered on the merits.

On May 23, 1942, the Ozark Coal Co. filed a petition with the Circuit Court of Appeals for the Sixth Circuit seeking a review and reversal of an order establishing prices for the coals produced by the company at its Arkansas mine. The cause has not yet been scheduled for argument.

⁵ On Aug. 10, 1942, on stipulation of counsel an order was entered in favor of the plaintiff for the full amount of the difference between the established minimum price and the contract price.

⁶ Eberhart's code membership was reinstated upon payment of a tax in the amount of \$4,648.41 as provided in section 5 (c) of the act.

Office of Solid Fuels Coordinator for War

HOWARD A. GRAY, Deputy Coordinator

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The war has exposed the coal supply to many difficulties and disruptions. The production of war goods, military activities, and their repercussions are substantially reducing the availability of manpower and necessary materials used in coal mining. Coal production requires much highly trained labor, men of military age and physical fitness, and huge quantities of such critical materials as steel, copper, rubber, and heavy machinery.

One of the most important elements bearing upon the coal supply that is being affected by the war is transportation. The movement of coal is the biggest job entailed in transporting any single commodity. The railroads normally carry approximately 85 percent of the supply some part or all of the way from the mines, over distances often long and through regions of congested rail traffic. Heavy tonnages are moved also by ocean shipping, inland waterways, and motor trucks, each offering its own peculiar wartime problems.

The war has increased the burden upon the transportation system enormously, but limitations of manpower, time, and materials have prevented a corresponding increase in transportation facilities.

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make it possible to provide sufficient coal of some kind, quality, or size to keep homes warm and factories running throughout the winter of 1942-43. However, in order to enable mines and carriers to supply the coal it will be necessary for dealers and consumers to order their fuel early enough to enable the mines and carriers to have full use of their limited manpower and equipment during the summer. This is necessary to reduce the fall peak in coal shipments to a size that will not overburden facilities, and to provide sufficient storage of coal in consumers' bins to protect them against any local emergencies or delays in shipments that otherwise might catch them without adequate fuel.

To bring about public cooperation in this task, the Solid Fuels Office, in cooperation with other Government agencies and industry, launched a "Buy Coal Now" campaign in the Spring of 1942. At the close of the fiscal year, consumers were cooperating heartily.

Both bituminous and anthracite coals were being produced and transported at a rate much higher than normal seasonal requirements, and, generally speaking, production and transportation were functioning relatively smoothly in light of war difficulties. The bituminous output was averaging well above 11,000,000 tons per week and anthracite was flowing in excess of 1,000,000 tons per week. Although the bituminous mines could supply much more, the anthracite mines were working at near capacity, due to the handicap of the results of a flood during the Spring. Ample transportation was available.

A great deal of this fuel was going into dealers' and consumers' storage. The amount of bituminous held in storage totaled 73,268,000 tons as of June 30, 1942, and was expected to exceed all past records in history before the end of the year. No records were available as to the amount of anthracite in storage, but factors indicated that it was high.

The production of bituminous coal during the first half of 1942 was estimated at 284,808,000 tons, or more than half of the year's anticipated requirements. Anthracite production for that period was estimated at 29,507,000 tons, or close to half of the year's expected requirements.

In addition to the summer coal storage drive, the Coordinator's office was engaged in numerous other activities designed to assure an adequate supply of coal, coke, and other solid fuels. Among them were:

1. A survey of the Nation's coal requirements, and of actual and potential mine production capacity. Although helpful preliminary information is now available from both studies, the latter one is not completed.
2. Studies of the adequacy of coal stocks held by consumers. Most of these investigations were carried out with the aid of the Bituminous

Coal Division and the War Department, and a survey of stocks held by war industries and the railroads was made in conjunction with the War Production Board. Wherever large war industry consumers or railroads were found to have insufficient coal on hand, they were advised to build up stocks. Essential consumers and war industries were advised to store sufficient coal to last from 90 to 120 days. Other industries were advised to store an average of 60 to 90 days' supply.

3. The planning and recommendation of emergency coal movements in various areas to supplement disrupted or deficient transportation via normal routes, or the inability of normal sources to supply wartime needs in various areas. It was necessary to arrange for emergency routing of coal, particularly to New England, to make up for the loss of colliers. Also, it was necessary to transfer heavy tonnages to all-rail routes to certain areas along the lower Great Lakes as a result of the diversion of lake colliers from coal to other war service. In other instances, the necessity for arranging supplemental movements into certain Midwestern areas and into the States of Washington and Oregon to make up for a deficiency in production capacity in the mines normally serving those areas is under study.

4. Survey of the availability of mine labor and consultation with the Selective Service System and the War Manpower Commission in effort to protect the mine labor supply. Preliminary studies indicate that the mines have suffered a net loss of upward of 40,000 workmen in the first half of 1942, because of the effects of the war.

5. Investigation of the need for priorities to enable producers to obtain necessary critical materials used in mining.

6. Studies of coke requirements, and the recommendation of necessary steps to assure sufficient coke to meet steel manufacturing needs. It appears that all coke requirements can be met, barring unforeseen difficulties, although a situation wherein the supply of low-volatile coking coals is tightening is being carefully watched.

7. Formulation of a proposed emergency distribution system for recommendation to the appropriate Governmental authority for establishment if and when necessary. The work of formulation is well under way.

War Resources Council

STEPHEN RAUSHENBUSH, Acting Director

ON December 7, 1941, the Secretary of the Interior put all employees and all bureaus of the Department on a war emergency basis. He established a War Resources Council, with Michael W. Straus as Director, to expedite this policy, and approved a war program to serve in mobilizing strategic natural resources of the Nation on the scale made necessary by global warfare. It has as its aim the supplying of essential raw materials, ores, minerals, metals, fuels, and power to the industrial processors and fabricators in order to attain the national war production goals set by the President. The Department and all of its agencies are devoting the full knowledge and experience gained through years of development, conservation, and study of these natural resources to the winning of the war. The council has been called upon to help in developing many parts of the program, and in coordinating the work of several bureaus.

Metals for War

Machines have made this war unique and have raised metals to first rank among essential war materials. Years of exploration and experiment have prepared the Bureau of Mines and the Geological Survey to move the country forward toward production on a victory scale by turning known but unused, low-grade materials into metals. The Department has begun to secure the immediate use of new processes tested in its own laboratories which can supply enough manganese to make 87 million tons of steel annually from low-grade domestic manganese ores. Its program is: To give all aid possible toward the establishment of plants using the Department's improved acid process for producing aluminum; to make available its magnesium processes utilizing domestic ores; to complete and secure the prompt use of a process for producing half a million tons of chromium concentrates annually from low-grade chromium ores; to develop a sponge iron program to meet the Nation's deficiency in scrap metal; to carry

explorations for copper, lead, zinc, iron, chromite, aluminous clays, vanadium, tungsten, and mercury to the point of action; to furnish the War Production Board as needed with a ranking of the best possible new developments of all critical ores; to formulate for it a domestic ore-buying program, and to stand ready to supervise it if requested.

Oil for War

Without petroleum products, the war machine of the United States and the United Nations could not function. Preparations to meet the challenge were made through the Office of the Petroleum Coordinator for War. This organization, although not a part of the Department of the Interior, was placed under the leadership of Secretary of the Interior Harold L. Ickes as Petroleum Coordinator. Its functions are among the most important of war activities, as the organization was charged with assuring an adequate supply of petroleum for both military and civilian use. While not an agency of the Department, the importance of its functions merit recognition in any discussion of the war responsibilities of the Secretary of the Interior.

The Office of the Petroleum Coordinator for War organized, through the industry, petroleum production based upon sound engineering techniques, stimulated exploration for new reserves. Its program is: To multiply the industry's capacity to manufacture high-octane gasoline; to establish new and more effective transportation methods required in moving blending stocks for aviation gasoline; to reshape the complex transportation system of the oil industry by substituting tank cars, trucks, barges, and pipe lines for tankers diverted to war service; to aid in marketing, and in the manufacture of rubber ingredients, and of toluene; to aid in a drilling campaign, and to aid in the production, handling, and transportation of petroleum products.

Power for War

The war budget of 56 billion dollars will require 154 billion kilowatt-hours of electric energy annually for the manufacture of airplanes, tanks, guns, warships, and fighting material. The Department is the major producer of power in areas where the principal undeveloped resources are located. Units recently completed at Boulder, Bonneville, and Grand Coulee Dams now make the Department ready to produce at the rate of more than 7 billion kilowatt-hours annually. The Department has begun to triple the 1941 output of producing agencies in the Department by the program now under way, and to add by 1945, about 1,480,000 kilowatts, with an output of 9 to 10 billion kilowatt-hours, to the power capacity now scheduled, by constructing new hydroelectric and steam plants.

Fuel for War

Coal provides half the Nation's energy, and coke fires the blast furnaces in the steel mills, and supplies many basic chemicals.

The Office of the Coordinator for Solid Fuels estimated that more than 600,000 000 tons of anthracite, bituminous, and lignitic coals were required in 1942, and 70,000,000 tons of coke. The facilities of the Department have been mobilized to see to it that an adequate supply of coals and coke is available where and when it is needed, to organize the production of coal so that sufficient quantities of necessary types and grades are available for war industries.

Its program is: To promote orderly production and distribution; to urge the maintenance of large reserves in consumers' storage; to encourage the conservation of high-grade coals for metallurgical uses; to aid users of special kinds or grades of coal; to determine minimum and maximum prices as required in the public interest; to administer the market regulatory features of the Coal Act in order to keep the bituminous coal mining industry in a sound operating condition, and to conduct a rigid mine safety inspection program for elimination of hazards.

Helium for War

Helium is a light, noninflammable war gas of which the United States Government has a world monopoly. To supply the increased demand for helium that has arisen from the war, the Department has begun to double in 1942 the record production of the 1941 fiscal year. It is making a comprehensive survey of gas fields suitable for helium production in order to select sites for additional helium plants. It is continuing research to reduce costs of production of helium.

Food for War

Adequate food is essential to success at arms. In many ways the Department contributes to the food supplies of the United Nations. It will increase these contributions. For example, the 1,921 million pounds of fishery products utilized in 1939 can be increased in a few years, without injury to the resources, to 3,582 million pounds through proper management and development.

The Department has begun to increase as required within the next few years by 1½ billion pounds, our fishing products. Its program is: To store and deliver water for the irrigation of 10,000,000 acres of land in the arid west for the production of food crops, long-staple cotton and other fibers, and rubber-bearing plants; to assure more adequate forage on Federal ranges for the 12,000,000 head of livestock grazing there, in order to increase up to 10 percent the products now

duced; to increase the production of cane and beets; to explore sources of aquatic products for use as foods, vitamin oils, and animal feeds; to augment predatory animal and rodent control work, including plague-bearing rodent control efforts, and to conduct a food-drying program to relieve demands on tin and containers.

Land, Water, Timber for War

The increased production of those war necessities which are products of the forest, of the land, and of the water is receiving careful attention in the Department which supervises and manages the Federal land estate of 283 million acres. The Department has begun to increase a billion board feet in 1942 and to a billion and a quarter in 1943, required, timber production from the Oregon and California reforested lands and from Indian reservations. Its program is: To establish a fire lookout and air-raid warning towers; to provide trained crews to combat forest fires; to assure water supplies for municipalities and military concentration; to aid road building in Alaska; to map areas of military significance; to provide hospital and other emergency facilities, together with medical staffs, along the West Coast and in Alaska; to increase the fur and wool supplies for clothing for the armed forces; to withdraw public lands and to clear them of mineral and other claims so as to permit the establishment of military ranges, airtonments, and aviation fields, and to provide special facilities for rehabilitation and recreation of members of the armed forces.

The council is now composed of Stephen Raushenbush (Acting Director); Under Secretary Abe Fortas; John C. Page, Commissioner of the Bureau of Reclamation; R. R. Sayers, Director of the Bureau of Mines; Joel David Wolfsohn, Assistant Commissioner of the General Land Office; and Walton Onslow, Acting Director of Information. H. Rutledge is Acting Director of the Western War Resources Council, with headquarters in Salt Lake City.

Petroleum Conservation Division

J. W. STEELE, Acting Director

ON April 1, 1942, the Petroleum Conservation Division began its seventh year of administration and enforcement of the Connally Act. The act, approved February 22, 1935, for a period of 2 years, extended by Congress in 1937, again in 1939, and in June 1942 made permanent, prohibits the transportation in interstate commerce of petroleum or its products produced in excess of amounts permitted by State laws.

During the fiscal year 1942, in addition to its regular functions, the Division has cooperated with other Government departments, particularly with the Office of Petroleum Coordinator, in furthering the defense effort. Monthly reports of operations received by Federal Tender Board No. 1 have proved invaluable sources of information in respect to petroleum resources.

Federal Tender Board No. 1, Kilgore, Tex., established March 1, 1935, to issue certificates of clearance on petroleum and its products moving in interstate commerce from the East Texas field, and to conduct investigations of violations of the act within and without that area, was, by an order of the Secretary of the Interior, approved by the President May 26, 1941, given supervisory authority over an additional area of 102 Texas counties, two counties of New Mexico, and the entire State of Louisiana. In this area, which comprises the major oil producing sections of the south and southwest, monthly reports of operations of producers, refiners, and transporters of petroleum are required to be filed with the Board, and subordinate offices of the Board are located at strategic points therein to investigate alleged violations of the act and to enforce the rules and regulations contained in the order of May 26, 1941.

Operations of Federal Tender Board No. 1

The order of May 26, 1941, became effective in the extended area August 1, 1941. Prior to that date, Federal Tender Board No. 1 had maintained active supervision in an area comprising two oil

fields containing 25,700 producing wells, with an average daily production of 330,000 barrels; 5 refineries, with an average daily production of 10,500 barrels; 16 casinghead gasoline plants, with an average daily production of 20,000 barrels of petroleum products. Since the Board assumed administrative jurisdiction over the extended area, active enforcement has been in effect in an area comprising 703 fields containing 71,500 wells with an average daily production of 1,650,000 barrels of oil; 70 refineries, with an average daily production of 1,480,000 barrels of oil, and 120 gasoline extraction plants with an average daily output of 96,600 barrels of petroleum products. All of the above operations are reported to Federal Tender Board No. 1 on sworn monthly reports, but certificates of clearance were required only in the designated five-county area of East Texas.

Subordinate offices of Federal Tender Board No. 1 were maintained during the fiscal year at Houston, Corpus Christi, and Midland, Tex., and New Orleans, La., within the above area, and at Wichita, Kans., outside the area.

Effective at the close of the fiscal year 1942, the requirement of certificates of clearance in the East Texas area was rescinded by order of the Secretary of the Interior, and that area will, after July 1, 1942, be included within the enforcement area designated by the order of May 26, 1941.

Criminal Investigations and Prosecutions

During the fiscal year 1942, the volume of routine investigations by the Board of producing, refining, and transporting facilities increased as a result of extension of the supervised area. In addition to these matters, eight cases of Connally Act violations under investigation on June 30, 1941, were completed, and several major investigations were initiated. Cases and investigations carried over from the fiscal year 1941 and those instituted during the fiscal year 1942 were disposed of as follows:

Of six cases pending in United States district courts on June 30, 1941, three were terminated by successful prosecution, one was dismissed upon recommendation of the United States attorney, and two were pending June 30, 1942.

Of two cases pending with the Department of Justice on June 30, 1941, one was closed by the United States attorney and one remains unchanged.

Of eight cases under investigation on June 30, 1941, three were closed by the Board for lack of sufficient evidence, five were completed and submitted to the Department of Justice, of which one was

successfully prosecuted and four were pending further action on June 30, 1942.

Of 19 investigations begun during the year, 6 were incomplete on June 30, 1942, 5 were closed by the Board for lack of sufficient evidence and 8 were submitted to the Department of Justice for prosecution. Of the latter 8 cases, 1 was successfully prosecuted, 2 were presented to grand juries and indictments returned, and 5 were pending action of the Department of Justice on June 30, 1942.

The five cases successfully prosecuted during the year resulted in assessment of fines totaling \$121,800, and imposition of several suspended sentences ranging from 6 months to 2 years.

General Land Office

FRED W. JOHNSON, Commissioner

THE need for new supplies of strategic minerals, power, and grazing facilities, and the military and naval requirements for large areas of public lands placed increased responsibilities upon the General Land Office during the fiscal year ended June 30, 1942. The regular activities of the General Land Office are now geared to meet war needs, and they are effectively coordinated with the activities of other agencies for the purpose of facilitating the prosecution of the war program.

The withdrawal of public lands has been expedited by Executive Order No. 9146, authorizing the Secretary of the Interior to sign public land orders effecting the withdrawals. These withdrawals include lands for aerial bombing ranges, antiaircraft fields, combat training areas, artillery practice grounds, air navigation sites, flying schools, ammunition storage, and ordnance depots. Designated employees are devoting themselves exclusively to this work and a priority of routing has been established on all matters relating to the war. More than 7,000,000 acres were withdrawn during the year, making an aggregate of more than 13,000,000 acres withdrawn for military purposes.

In addition to the millions of acres of public lands made available by the General Land Office, the Government is acquiring for military and allied purposes extensive acreages of other land, which raises a serious post-war land use question. The General Land Office is studying this problem along with the other studies being made relative to uses of public lands which are to be returned to its administration at the close of the war under the reversion clauses in the withdrawal orders.

The war has prevented the importation of many minerals from their usual sources and these products must now be obtained as far as possible from domestic deposits. The General Land Office has cooperated with the Defense Plant Corporation, the Metals Reserve Co., the Reconstruction Finance Corporation, and other agencies in developing strategic and critical minerals.

In order to help make our Nation more self-sufficient, the General Land Office is conducting studies to determine new uses that may be made of resources on the public domain. New values are being found in the minerals, natural vegetation, sites for health and recreation, and other resources which heretofore were considered of little importance or not known to exist. Commercial quantities of strategic minerals may be developed from hitherto unused deposits, and such materials as fiber, rubber, turpentine, and resin may be produced from desert shrubs. A number of health and recreational sites have already been developed in desert areas. Barren desert areas so sparsely vegetated as to have little or no value for grazing or agriculture have been found to have terrain and climate especially adapted to the training of our armed forces. Other areas heretofore remote, inaccessible, and thinly populated have, because of these limitations, become very valuable for such purposes as heavy artillery or bombing practice areas.

Recent legislation has authorized the Secretary of the Interior to lease or sell lands in the public domain "for use in connection with the manufacture of arms, ammunition, and implements of war, or the production of equipment, supplies, and materials, or machinery usable in such manufacture." Under the Secretary's regulations, the Commissioner of the General Land Office will negotiate transactions providing land to be used for its yield of timber, sand, gravel, and stone; and as factory sites, housing development sites for war workers, and as expansion area for plants bordering the public domain.

Notwithstanding the increased burdens incident to the war which were handled without increased appropriation, the General Land Office maintained its position as one of the few agencies of the Federal Government whose operations resulted in revenues exceeding expenditures. Total cash receipts from all sources during the year amounted to \$9,014,172.87, which represents an increase of \$1,281,830.94 over the preceding year. The receipts were almost four and one-half times the amount of the expenditures (\$2,047,504.64), and this was the sixth consecutive year in which the receipts were in excess of \$7,000,000.

With the development of war plans, the Oregon and California Revested Lands Administration of the General Land Office immediately gave particular attention to special war needs, in addition to providing for the needs of the industry in manufacturing the usual types of lumber.

The volume of timber cut during the year was 456,131,000 board feet which represents an increase of 19 percent over the cutting of the preceding year.

During the fiscal year, the General Land Office increased its efforts to provide grazing land in areas in the Western States outside of

ing districts, and it now has outstanding 8,821 leases, covering 1,843.19 acres.

Because of the special hazards due to the war, the General Land Office greatly increased its fire prevention and suppression activities in the "O and C" forests in Oregon, the forest area in Alaska, and on public domain generally.

During the past fiscal year, many township plats and State maps were furnished to the War Department. For many parts of the United States, the best map data available for military purposes are the General Land Office township plats showing the boundaries of sections and the general topographic descriptions compiled in connection with the public land surveys.

The efficiency of the General Land Office was enhanced through the creation of a Branch of Field Examination by Secretary's order of January 17, 1942. It is the function of this branch to make such sections, surveys, or other field examinations as are essential to the operation of the General Land Office and of such other agencies of the Department as may best be served by it. The staffs for this branch, including regional field staffs at San Francisco, Calif.; Billings, Mont.; Salt Lake City, Utah; and Albuquerque, N. Mex., were supplied by the Division of Investigations of the Department which heretofore had handled such field examination work.

The total number of permanent employees of the General Land Office as of June 30, 1942, was 776. Of this number, 447 employees were stationed at headquarters in 36 cities in 13 Western States and Alaska.

Recommendations

As a result of the experiences and problems of the General Land Office, the following recommendations are made:

1. A leasing system applying, under certain conditions, to all minerals not now subject to leasing is urged. With respect to metallic minerals, there are no leasing or similar laws under which the Federal Government can share in any gains that might result from exploration or development work. As a result of the operation of the present mineral laws, metallic mineral deposits, upon discovery, may pass immediately into private ownership, and therefore, there are no known reserves of the metallic minerals on the unappropriated, unreserved public lands of the United States. New interest in the possibilities of producing strategic and other minerals on public domain lands has arisen because of the requirements of the war. Some procedure should be made possible, therefore, under which the Government could carry on additional exploratory work for metallic minerals on public domain lands and retrieve any minerals from discovery for the benefit of the Government and the

public. Such a procedure would make it economically feasible to carry on much exploratory work not otherwise possible. An important part of such a procedure would be the requirement that the lands be segregated so that they would not be subject to mineral claims but rather to mineral leasing laws.

2. In order that the Government may have a better knowledge and insight into the situation with regard to minerals, especially strategic and critical minerals, placer claim holders should be required to record their claims in the district land offices.

3. Provision should be made to prepare a comprehensive report upon a plan for the post-war development of the Territory of Alaska. The report should include not only the necessary basic information upon resources, conditions, and markets, but also recommendations for legislation, financing, and procedure. Such a report is necessary as a basis for planning an integrated economic development, increasing the permanent welfare of the present and future population of the Territory.

4. In administering the 5-Acre Tract Act, a number of difficulties have arisen because of the short-term lease system. It is recommended that the tracts could be made much more satisfactory to the owner if he wished to place substantial improvements on them, and that at the same time the public interest would be better protected, if, for unclassified lands, long-term leases could be granted. Study should be made as to the desirability of permitting sales in special areas.

5. In the interest of conserving our natural resources, additional attention should be given to war and post-war fire protection and control on public domain lands. In Alaska, particularly, additional effort should be given to protecting public domain forested grass lands, tundra, and coal deposits from destruction by fire. Not only are there millions of dollars worth of direct damage done annually to these resources, but inestimable damage is done in land erosion and destruction of all forms of wildlife.

6. Federal public lands are now administered under some antiquated public land laws. It is recommended that at the first opportunity provision be made for the careful study and restatement of the public land laws.

Military Reservations and Withdrawals

From July 1, 1941, to June 30, 1942, withdrawals from the public domain in the United States and Alaska aggregating more than 7,000,000 acres were made to permit construction and operation of facilities required by the Army, the Navy, and the Civil Aeronautics Administration.

The registers of the district land offices determined the status of thousands of acres and contributed their special knowledge of the districts in assisting in the selection of lands suitable for war purposes. Upon request of the Navy Department, the field examiners of the General Land Office assisted in the appraisal of privately owned lands. The General Land Office investigated thousands of patented mining claims in withdrawals for War Department use.

Strategic, Critical, and Other Minerals

The leasing and other activities of the General Land Office were greatly increased insofar as they may help to accelerate the production of minerals essential to the prosecution of the war. Every effort has been made to provide mineral lands and to facilitate their production to the fullest extent.

In opening reserved mineral deposits to exploitation, the General Land Office has made available large quantities of such minerals as copper, iron, lead, zinc, silver, and other minerals equally essential to the war effort. The production of oil and gas from 690,919 acres of leased public land is of vital importance. The potash reserves in New Mexico and California, operating under leases, now provide large supplies of potassium at less than one-sixth of the price paid for potassium during the First World War. Rents and royalties paid to the Government on mineral leases and permits amounted to \$393,046.37 for the fiscal year 1942, as compared with slightly over \$300,000 for the preceding year.

Food, Fiber, Leather, and Rubber

The production of beef, mutton, lamb, wool, mohair, and leather on the western ranges constitutes a very important contribution toward winning the war. During the period covered by this report, the General Land Office intensified its efforts to provide necessary grazing land and it now has outstanding 8,821 leases, covering 9,871,843.19 acres. Work is now under way on converting these leases from a short-term to a 10-year basis.

From July 1, 1941, to June 30, 1942, the General Land Office expended \$255,417.70 of Range Development Service and Soil and Water Conservation funds in the rehabilitation of public domain lands situated in the 10 Western States. The primary purpose of the range development work is to increase the carrying capacity of these lands from 500,000 animal units per year to 750,000 animal units. This objective can be accomplished by the exercise of proper range improvement and by an extended program of water development, reseeding, destruction of noxious weeds, rodent control, and

similar measures. Although it will take a considerable period of time in which to bring about the desired result, effective headway was made in this direction during the period under consideration.

In the interest of the livestock industry, stock driveway withdrawals in Arizona, Colorado, Nevada, Idaho, Montana, Washington, and Wyoming, covering 10,928 acres, were made during the year. Other adjustments were made for the purpose of improving the location and increasing the usefulness of the driveways. These withdrawals and adjustments are of particular significance to the prosecution of the war as they have facilitated the movement of stock made difficult by the curtailment of other means of transportation. Stock driveway revocations, releasing for grazing purposes lands no longer needed for driveways also have been prepared.

Investigations have been made of the possibility of using yucca growing on the public domain as a substitute for fibers that can no longer be obtained from the usual sources. Information has also been gathered on the possibilities of helping to relieve the rubber shortage, particularly through furnishing land for raising guayule, and making rabbit brush available from the public domain.

Lumber and Timber

The volume of timber cut during the year from lands under the jurisdiction of the Oregon and California Revested Lands Administration of the General Land Office was 456,131,000 board feet, which represents an increase of 19 percent over the cutting of the preceding year. Sales of timber on these lands amounted to 482,271,000 board feet. The quantity sold showed a decrease of 2 percent, as compared with the preceding year, but on a value basis sales showed an increase of 24 percent. The chief factor affecting the rate of timber cutting at the present time is the limited ability of the industry to produce. Owing to the great need for lumber for war construction and as substitutes for steel, demand is far greater than present ability to produce.

The "O and C" Administration has employed additional personnel, partly for the purpose of making and supervising timber sales which call for the cutting of special grades of timber required in the war program. The cutting of these special grades causes much unnecessary waste, unless carried out on a selective basis and properly supervised.

The "O and C" Administration participated in special surveys to determine how much Sitka spruce, suitable for aircraft manufacture, is available, and to determine the volume and location of the remaining supply of Port Orford cedar on "O and C" and other lands.

As a contribution to the defense of the Northwest, the Civilian Conservation Corps, under the supervision of the "O and C" Administra-

tion, built various war structures including revetment structures needed by the armed forces for the protection of aircraft. In other ways, the three Civilian Conservation Corps camps assigned to the General Land Office for work in the "O and C" area were utilized more than ever because of the importance of forest and forest products in time of war. In this connection, 10.8 miles of new high standard truck trails were constructed and 60 additional miles were maintained and improved. The importance of this work was recently highlighted by the designation by military authorities of one of the CCC constructed trails as an important link in the military transportation system of the coastal area. Other activities included the construction of telephone lines and horse trails, fire hazard reduction, forest nursery development, reforestation, white pine blister rust control, preparation and transportation of materials, and forest fire suppression, all of which contribute to the conservation of a nation's forest resources and to the security of a country at war. The closing of these camps on June 30, 1942, brought to an end the fine work they were doing in the protection and development of the "O and C" forests.

Fire Protection

The General Land Office increased its fire prevention and suppression activities, especially in the "O and C" forests in Oregon and the forest areas in Alaska, because of the additional hazards incident to the war.

In order to coordinate the forest fire-control activities of all agencies within the State of Oregon, the Oregon Forest Defense Council was created. Through the work of this Council, plans and policies were adopted which will greatly increase the effectiveness of fire-suppression agencies not only in meeting and handling the normal but also the abnormal forest-fire condition. Pursuing the cooperative policy which is guiding the forest-fire activities within Oregon, the "O and C" Administration has established several emergency fire-control camps to augment regular forces in such a way as to deal effectively with any emergency which may arise as a result of the war. Arrangements have been made with other protection agencies whereby the fullest cooperation will be maintained at all times in order that all forest, brush, or grass fires will be controlled as quickly and efficiently as possible with a minimum disturbance of war work.

The Alaskan Fire Control Service, under the jurisdiction of the General Land Office, is charged with the prevention and suppression of fires on the public domain lands of Alaska. Of the approximately 323,000,000 acres of vacant and unreserved public domain, an estimated 250,000,000 acres of timber and grazing lands need fire protection to assure continuance of Alaska's rich natural resources of timber,

furs, and wildlife. An additional amount of \$115,000 has been made available for prevention and suppression of forest fire to supplement the regular appropriation of \$27,000. A vigorous educational program in fire prevention has been continued during the past year. Because of war limitations on paper and radio releases, greater emphasis has been placed on personal contact in group gatherings, such as 4-H Clubs, Boy Scouts, Girl Scouts, Chambers of Commerce, and Service Clubs. The objective has been to bring fire consciousness to every class of people.

A Civilian Conservation Corps camp, under the supervision of the General Land Office, continued its work of suppressing the outcrop coal fires which were threatening with destruction an inestimable amount of the Nation's coal resources lying in the vicinity of Little Thunder Basin, Wyo. These coal deposits represent a fuel reserve of untold value. Despite the closing of this camp in May, all of the fire-suppression projects except one are in good enough condition to withstand further combustion for some time. However, several of the projects have not been completed and work should be resumed as soon as possible.

Surveys and Maps

Surveys have been undertaken at the request of agencies engaged in war work. The following surveys and resurveys, important to our war activities, were authorized, in progress, or accepted between July 1, 1941, and June 30, 1942: a resurvey in Colorado, requested by the Bureau of Mines in connection with helium production; a resurvey in Utah, requested by the Bureau of Mines in connection with exploratory drilling for magnesium; resurveys in Nevada, requested by the War Department; resurveys in California, requested by the War Department; survey in California of the Argus townsite needed to provide housing of workmen employed in potash and other war chemical plants; surveys in Alaska which were necessary in connection with War and Navy activities; and a resurvey of 65,500 acres of O and C land in western Oregon.

Land Classification

The purpose of land classification is to facilitate the best use of the land. Recent events have further emphasized that changing conditions and new demands affect what constitutes best land use. The impact of the war, for example, has created uses not existing or in demand in 1934 when the Taylor Grazing Act went into effect. Fortunately, large areas of the public domain have been found to be eminently suited for necessary war purposes.

Changing economic conditions have likewise resulted in a great variety of demands for use of the public lands. The construction of new roads into previously isolated areas, the erection of war plants, the

development of air fields, the extraction of minerals and the increased demand for recreational facilities are but a few of the causes which make it impossible to classify permanently lands for one use or another.

A number of area examinations and classifications, as distinct from classifications of tracts embraced in specific applications, have been undertaken during the past year. These areas, among others, are the Fence Lake-Quemado area of western New Mexico and the Dove Creek region of southwestern Colorado and southeastern Utah. Classification in these areas entails consideration of the social, economic, and agricultural problems incidental to dry farming, further complicated by relative isolation and a short growing season. The Casa Grande area of the Santa Cruz valley in Arizona presented a ground-water problem, which involved a determination of the relation of the ground-water supply to permanence of agriculture in the region, to find out where and to what extent additional public land could be reclaimed for agricultural purposes.

The Public Lands

The original public domain, exclusive of Alaska, aggregated 1,442,267,520 acres. As of June 30, 1942, 1,322,241,257 acres had been surveyed, leaving 120,026,263 acres unsurveyed. In Alaska, embracing about 365,481,600 acres, the area surveyed as of June 30, 1942, was 2,277,469 acres, leaving 363,204,131 acres unsurveyed.

On June 30, 1942, the area of the vacant and unreserved public lands, exclusive of Alaska (unreserved except for the general orders of withdrawal issued in 1934 and 1935) aggregated 38,504,043 acres outside of grazing districts. The area of vacant public lands within grazing districts and subject to grazing use was 135,504,043 acres. The area which was vacant and unreserved, in Alaska, is estimated at 323,000,000 acres.

Leases and Permits

The extent of the leasing activities of the General Land Office is shown by the following tables:

Mineral leases, permits, and licenses outstanding,¹ as of June 30, 1942

Mineral	Leases		Permits		Licenses		Total	
	Number	Acres	Number	Acres	Number	Acres	Number	Acres
Coal	372	71,284	124	89,607	99	3,193	595	164,084
Oil and gas	3,325	2,562,222	14	27,477			3,339	2,589,699
Phosphate	7	4,938					7	4,938
Potash	20	47,092	1	2,539			21	49,631
Sodium	4	1,873	101	156,641			105	158,514
Total	3,728	2,687,409	240	276,264	99	3,193	4,067	2,966,866

¹ Act of Feb. 25, 1920 (41 Stat. 437), and other acts.

² 1,453 producing leases (690,919 acres); the remainder are prospecting leases.

³ Alaska.

Leases other than mineral leases outstanding, as of June 30, 1942

Type of lease	Number	Acres	Annual rental
Aviation	40	25,915.90	\$475.00
5-acre tracts	298	1,490.00	1,490.00
Fur farm (Alaska)	20	96,080.00	800.00
Grazing (Alaska)	9	1,168,953.93	1,269.35
Grazing (Taylor Act, sec. 15)	8,821	9,871,843.19	196,452.89
Recreational	18	19,899.19	1,463.52
Water well	10	400.00	360.50
Others	3	153.01	10.00
Total	9,219	11,184,735.22	202,321.26

Mineral land withdrawals and classifications outstanding, as of June 30, 1942

[In acres]

Class of mineral land	Area withdrawn	Area classified	Total
Coal	24,017,364	34,923,945	58,941,309
Oil	24,859,154	71,884	4,931,039
Oil shale	5,089,949	4,081,208	10,071,157
Phosphate	1,889,601	302,219	2,191,820
Potash	9,411,906	.....	9,411,906
Metallic minerals	8,507	.....	8,507
Total	46,176,481	39,379,256	85,555,737

¹ Includes 5,229 acres of coal land reserved for the use of the United States (Coal Reserves Nos. 1 and 2).² Includes 13,578 acres withdrawn as a helium reserve.**Acres of lands patented with minerals reserved to the United States, as of June 30, 1942**

Type of mineral reservation	Patented during fiscal year 1942	Total patented through June 1942
Reservation of all minerals:		
Under stockraising act	193,861	33,433,330
Under other acts	665,415	1,897,514
Total	859,276	35,330,844
Reservation of specific minerals:		
Coal	10,224	10,846,077
Others ¹	14,371	1,859,722
Total	24,595	12,705,799
Grand total	883,871	48,036,643

¹ Includes coal reserved in combination with other minerals.**Homesteads, Sales, and Other Entries**

Transfers of lands under laws providing for homesteading and mining claims and for sale of isolated tracts, timber, stone and town sites, are shown in the tables which follow:

Original entries and selections ¹ fiscal year 1942

Type of entry or selection	Public lands		Ceded Indian lands		Total	
	Number	Acres	Number	Acres	Number	Acres
Homestead entries:						
Stockraising.....	14	8,451			14	8,451
Enlarged.....	7	1,503	(¹)	38	7	1,541
Reclamation.....	59	6,805	2	229	61	7,034
Forest.....	5	296			5	296
Sec. 2289 R. S., et al.....	198	20,073	(¹)	40	198	20,113
Total.....	283	37,128	2	307	285	37,435
Other entries and selections:						
Desert land entries.....	18	1,738			18	1,738
State selections.....	50	85,311			50	85,311
Timber and stone application.....	1	39			1	39
Mineral applications and adverse claims.....	121	10,165			121	10,165
Townlots ²	97	(³)			97	
Lieu selections.....	2	115			2	115
Strip selection.....	1	40			1	40
Total.....	290	97,408			290	97,408
Grand total.....	573	134,536	2	307	575	134,843

¹ An original entry or selection is one made in pursuance of an act of the Congress which prescribes the terms and conditions under which patent may be issued or other evidence of title granted. An original entry becomes a final entry upon compliance by the entryman with further requirements of the law, such as residence or additional payment, and upon the issuance of a final certificate. A State selection becomes final upon certification by the Commissioner of the General Land Office.

² One entry amended.

³ Townlots upon which only part payment was made.

⁴ Area not tabulated.

Final entries ¹ fiscal year 1942

Type of entry	Public lands		Ceded Indian lands		Total	
	Number	Acres	Number	Acres	Number	Acres
Homestead entries:						
Stockraising.....	286	138,989	17	6,460	303	145,449
Enlarged.....	29	7,541	4	547	33	8,088
Reclamation.....	214	21,455	45	5,668	259	27,123
Forest.....	6	844			6	844
Commuted.....	5	500	13	824	18	1,324
Sec. 2259 R. S., et al.....	187	18,678	15	1,161	202	19,839
Total.....	727	188,007	94	14,660	821	202,667
Other entries:						
Desert land entries.....	52	7,192			52	7,192
Public auction sales ²	230	20,256	3	284	233	20,540
Timber and stone entry.....	1	39			1	39
Mineral entries.....	107	10,860			107	10,860
Miscellaneous entries.....	157	5,989	³ 14	4,404	171	10,393
Total.....	547	44,336	17	4,688	564	49,024
Grand total.....	1,274	232,343	111	19,348	1,385	251,691

¹ A final entry is one upon which final certificate has issued showing that the law has been complied with and that in the absence of irregularity, the entryman or claimant is entitled to a patent. If the requirements of the law have been met, the equitable title to the land passes to the claimant upon the issuance of the final certificate.

² Isolated tracts.

³ One entry (4,080 acres) on Indian tribal lands.

Patents and certifications,¹ fiscal year 1942

Type of patent	Public lands		Ceded Indian lands		Total	
	Num-ber	Acres	Num-ber	Acres	Num-ber	Acres
Homestead patents:						
Stockraising.....	380	191,439	11	1,227	391	192,665
Enlarged.....	41	10,141	41	5,559	82	15,700
Reclamation.....	306	30,064	1	160	307	30,224
Forest.....	18	1,203			18	1,203
Committed.....	5	414	1	120	6	534
Sec. 2289 R. S., et al.....	210	22,111	17	1,336	227	23,447
Total.....	960	255,372	71	8,402	1,031	263,774
Desert land patents.....	57	9,417			57	9,417
Public auction patents ²	279	29,641			279	29,641
Timber and stone patents.....	4	279			4	279
Mineral patents.....	89	4,392			89	4,392
Indian patents.....	108	8,985	185	43,231	293	12,216
Miscellaneous cash sale patents.....	164	6,450	3	640	167	7,090
Exchange patents.....	234	704,003	1	2,914	235	706,917
Curative and supplemental patents.....	4312				312	
Miscellaneous patents.....	102	7,150	2	4,093	104	11,243
Total.....	2,309	1,025,689	262	19,280	2,571	1,044,969
Certified to states.....		10,447				10,447
Grand total.....	2,309	1,036,136	262	19,280	2,571	1,055,416

¹ Where upon final examination it is found that an entry or selection is in proper form and that the law has been complied with, a patent conveying the legal title to the claimant is issued. In the case of indemnity state selections, the legal title is conveyed upon approval thereof by the Secretary of the Interior and certification by the Commissioner of the General Land Office.

² Isolated Tracts.

³ Indian tribal lands.

⁴ Acreage not counted because previously reported.

⁵ Includes a small number of patents on Indian lands.

Land Grants

Despite the concentration of its efforts on war activities, the General Land Office has maintained its peacetime functions of assisting the States in providing for schools and internal improvement. Indemnity school land selections, amounting to 6,777.75 acres, were approved and certified to the States, with minerals reserved to the United States upon 1,760 acres. Selections under quantity grants to States for specific purposes, embracing 1,455.02 acres, were approved and patented with all minerals reserved to the United States, and 1,142.24 acres of swamp lands were patented. Patents for granted school sections were issued for 600,311.26 acres.

The rights of the land-grant railroads to institute higher rates for certain Government transportation services in return for releasing claims to additional lands expired on September 18, 1941, under the provisions of the Transportation Act of 1940. Before the expiration date, 65 of the 72 unforfeited railroad grants had been formally closed and the remaining 7 had been filed for closing. This brought to an end a phase of land activity which in pioneer years was of outstanding interest to the developers of the West.

Applications for 381 rights-of-way for railroads, highways, reservoirs, irrigation, and telephone, telegraph and pipe lines were approved.

Of the number approved, 155 were for permits or easements, with an annual rental of \$4,250.

Land Exchanges

Exchanges with private owners of land resulted in the addition to grazing districts of 19,830.42 acres, in exchange for 30,394.38 acres of Government lands; to a bird refuge 4,491.83 acres in exchange for 1,960.25 acres of Government land; to Indian reservations 17,889.70 acres in exchange for 167,135.18 acres of Government land; and to the national forests 484,804.17 acres in exchange for 10,524.7 acres, and in addition sufficient timber to equalize the values as is permitted in exchanges of this character.

Exchanges of lands with the States under the Taylor Grazing Act amounted to 492,269.02 acres, with all minerals reserved to the United States. These exchanges were made upon an equal area basis. Other exchanges of lands with the States amounted to 5,388.74 acres, patented or certified.

Receipts and Expenditures

The total cash receipts from all sources were \$9,014,172.87. The total expenditures from appropriations made for the conduct of the bureau were \$2,047,504.64.

The following table shows the distribution of the receipts:

Disposition of receipts of the General Land Office,¹ fiscal year 1942

Source of receipts	Covered in the Treasury earmarked for—				
	General fund	Reclamation fund	States and counties	Indian trust funds	Total
Sales of public lands	\$38,700.12	\$90,018.26	\$4,688.44		\$133,406.82
Fees and commissions	10,602.78	33,272.14			43,874.92
Mineral leases and permits:					
Mineral Leasing Act	\$ 691,925.29	3,630,606.23	2,593,290.16		6,915,821.68
Recl River oil and gas lands			2,569.14	\$4,281.89	6,851.03
Potash	39,623.38	\$ 254,435.04	148,587.69		442,646.11
Other ⁴	27,727.55				27,727.55
Total mineral	759,276.22	3,885,041.27	2,744,446.99	4,281.89	7,393,046.37
Oregon and California grant lands	239,503.21		718,509.62		958,012.83
Cos Bay grant lands	184,498.35		\$ 25,700.00		210,198.35
Taylor Act grazing leases	97,425.24		97,425.23		194,850.47
Rights-of-way leases	32,991.44				32,991.44
Sales of Reclamation town lots		\$ 6,510.99			6,510.99
Sales and lease of Indian lands				5,612.49	5,612.49
Copying fees	15,463.65				15,463.65
Miscellaneous	20,204.64				20,204.64
Grand total	1,398,665.55	4,014,842.66	3,590,770.28	9,894.38	9,014,172.87

¹ Before final settlement of all accounts by the General Accounting Office.

² Includes \$381.25 collected in Alaska.

³ Includes \$46,412.27 collected in California under act of Oct. 2, 1917 (40 Stat. 297).

⁴ Includes \$16,344.35 collected in Wyoming under act of June 26, 1926 (44 Stat. 1621) and \$10,883.20 collected in Alaska.

⁵ Estimate.

⁶ Includes \$58.74 collected from sales of Reclamation lands under act of May 20, 1920 (41 Stat. 605).

Grazing Service

R. H. RUTLEDGE, Director

EVENTS of the 1942 fiscal year broadened the scope of Grazing Service activities and tested its ability to meet new situations caused by the stress of sudden and total war.

Immediately after Pearl Harbor the Secretary of the Interior placed the Department on a wartime footing, declaring that: "Actions upon matters resulting from declarations of war will have precedence over all other duties." Spurred by that declaration, the Grazing Service reexamined its problems and stepped up its operations to a war tempo, gaining momentum as the year progressed. Advisory boards, other ranchers, and citizens cooperated to protect forage and timber resources, produce more meat and fiber, and to promote full partnership in the fight for survival.

New uses of public lands.—To meet the increased demands made upon the range by war, the public domain took on new and added importance. Furnishing proving grounds for the thousands of American planes, bombers, and tanks, nearly 3,500,000 acres in Federal grazing districts were converted during the year into training areas, bringing the area withdrawn for military purposes in 2 years to 8,500,000 acres. Although requiring sudden adjustment in some cases, stockmen gave whole-hearted support to the program. At the same time livestock production was kept on a high level. Certain hardships were experienced by growers in some areas but to them the training program was of paramount importance.

Decentralization.—During the first week of August 1941, the transfer of the headquarters of the Grazing Service from Washington to Salt Lake City was completed.

Salt Lake City is at the hub of the Federal range territory. Spokes radiate from this hub to the 10 regional offices, none of which is more than 500 miles from the Director's desk in the Walker Bank Building.

In bringing the Grazing Service to the center of its job, the transfer helped to advance cooperation among all agencies engaged on western resource problems. Technicians of the Department were brought to-

gether to discuss how the several agencies could contribute, promptly and effectively, to the solution of the war problems.

Western War Resources Council.—At the suggestion of the Director of Grazing, 20 men from the several Interior Department bureaus operating in Western States met in March 1942 and organized a Western War Resources Council to coordinate ideas and to integrate facilities for war purposes. The Director was made chairman and his office was designated as a clearing house for information and prompt contact with war agencies, producers, and the Secretary's War Resources Council. In this way technical and skilled assistance was rendered promptly to individuals, corporations, agencies, and groups working on discovery, development, merchandising, transporting, stockpiling, and processing of materials for war.

National Advisory Board Council.—Livestock people cooperated in every way possible to protect resources and to help win the war. Reflecting full accord of the industry, the National Advisory Board Council recommended a program to maintain the ranges in full productive capacity, organize range users to protect ranges and forests against fire and other destructive elements, combat subversive activities and sabotage, and produce more pounds of wool, meat, and hides by better husbandry of range and stock.

This council, composed of 20 leading stockmen in the 10 range States, continues to cooperate on all matters of vital interest to the industry itself and the 21,000 licensees and permittees in grazing districts.

The Federal Range Code.—A revised draft of the Federal Range Code, which had been considered jointly by the advisory boards and the Grazing Service during the previous year, was studied by the National Advisory Board Council in Salt Lake City in January 1942. Upon conclusion of its 2-day session, and agreement on certain further changes, this council voted that the revised code be submitted to the Secretary for approval.

Protection of nonuse.—Under the full impact of war, policies of conservation with use undergo the supreme test, and the experiences of the past year have broadened public support for these fundamental principles.

An important part of the Nation's Food-for-Victory program is to produce more tonnage of meat and yet maintain the range in good vigor. In recent years stockmen themselves have proven that this can be done with greater net returns realized. In many areas it has been achieved by voluntary reduction of numbers, improved breeding, culling of herds, and better range management coupled with water development and other improvements. The livestock operator and the Grazing Service have never before been so closely in agreement on the dual objectives of conservation with economic use, and the

percentages of operators who are applying these principles are increasing steadily.

The Secretary, recognizing the need for the protection of operators brought about by the unusual conditions existing because of the war, established a departmental policy of granting nonuse permits for an indefinite period when:

1. The range is overstocked and the operator voluntarily states that he is willing to run the reduced numbers until such a time as the range shows improvement.
2. The range is not overstocked but the operator is unable to obtain replacement numbers after selling or culling for the purpose of meeting increased marketing goals that are established as a part of the Food-for-Victory program.

Going one step further, he extended the same privilege under other conditions which may arise, but which are entirely beyond the control of the individual operator.

Licenses and Permits.—Stockmen took advantage of good prices to reduce numbers and shape herds, resulting in a decrease of 111,101 head on the range as compared with the previous year. A total of 6,110, or about 29 percent of the users, were on a term permit basis at the end of the fiscal year. Matters that deterred the desired progress on permits have been cleared up in most regions, and a high percentage of all users will be on a permit basis at an early date. Wilful trespass was kept to a minimum due to the cooperation of range users and to further subdivision of the range into individual and group allotments. A summary of range use in 1942 is shown in Table 1.

TABLE 1.—Livestock use of grazing districts, fiscal year 1942

Region	Number of licensees and per- mittees	Number of cattle	Number of horses	Number of sheep	Number of goats	Total live- stock
Arizona	648	100,364	3,391	118,155	29,981	251,891
Colorado	2,111	179,640	5,351	798,438	98	983,527
Idaho	3,280	200,679	20,366	1,613,324	118	1,834,487
Montana	2,955	151,840	24,425	974,281	46	1,150,592
Nevada-California	1,832	347,818	19,721	944,621	4,837	1,316,997
New Mexico	2,136	282,863	14,443	619,702	81,687	998,695
New Mexico No. 7	1,378	4,755	8,525	150,696	19,056	183,022
Oregon	1,417	186,869	14,352	470,028	-----	671,249
Utah	3,946	195,572	10,129	1,705,652	13,840	1,925,198
Wyoming	1,446	159,846	13,154	1,479,123	360	1,652,453
Total	21,249	1,810,246	133,857	8,874,010	150,023	10,968,138

Reseeding.—Range reseeding experience furnished a valuable guide to better future methods and to the selection of species which are most likely to succeed on the arid and semiarid ranges. A total of 199,670 acres was reseeded in 1942 compared with 66,000 acres the previous year. It has been definitely shown that for successful reseeding there

must be a coordinated program of rodent control and other control features.

Range Surveys.—Nineteen million acres of range lands were surveyed and a recheck survey accomplished on 10 million acres during the year. Most of this field work was compiled and kept current for administrative use.

Advisory boards continued to give their support financially and otherwise to the range survey program, and this technical work reached a new high in its contributions to the objectives of the Service.

Soil and Moisture Conservation.—The second year of activities under the President's Fourth Reorganization Plan dealing with soil- and moisture-conservation work in grazing districts advanced the over-all range development program. Original range project areas were reduced in size, conforming to grazing administrative units, and the soil and moisture work became an integral part of the entire job, being coordinated into a closely knit Departmental program.

Range Studies.—Work at the Squaw Butte Range and Livestock Station was correlated with the Harney Branch Agricultural Station at Burns, Oreg., under a superintendent employed by the Grazing Service. Conducted as before in cooperation with the Oregon State Agricultural College, the new arrangement afforded a year-long livestock study applicable to a ranch and range empire aggregating about 30 million acres in four States.

The collection of actual range use records through utilization checks continued to furnish guides for helping the stockmen and the Grazing Service determine rate of stocking, seasons of use, and other information where range surveys are as yet incomplete. The range appraisal study was continued by collecting additional range-operation data. No recommendation has been made as to the establishment of grazing fees varying from those now in force, such being held in abeyance until after the war. Cooperative range studies were expanded to many areas in several States. Field work on the Elko County, Nev., project was completed and the results analyzed, compiled, and shaped for joint publication.

Wildlife.—Wildlife conservation, predatory animal control, rodent control, and State Pittman-Robertson Act projects advanced under continued cooperation with the Fish and Wildlife Service, with other Federal agencies, and with States and groups interested in such problems in grazing districts. In certain congested areas plans were developed to increase the big-game kill under systematic hunting supervised by appropriate authorities. Surveys indicate a big-game population of about 419,000 such animals in Federal grazing districts, with some only seasonally.

Range Improvements and Maintenance.—Range improvement work was confined largely to water development, construction of trails and

feeder roads, revegetation, maintenance, and other activities requiring little or no critical material. With dwindling enrollee strength and shortage of materials, the accomplishments fell below those of the previous year when 89 camps were maintained in full operation. A summary of major accomplishments for the fiscal year and for the period April 1935 to June 1942, is shown on Table 2.

TABLE 2.—Major range improvements, end fiscal year 1942

Type of project	Unit	Fiscal year 1942	Total, April 1935 through June 1942
Springs.....	Number.....	182	826
Reservoirs, for watering stock.....	Number.....	420	1, 795
Wells.....	Number.....	60	299
Pipe and tile conduits.....	Linear feet.....	31, 845	276, 138
Fences.....	Miles.....	1, 018	5, 413. 3
Cattleguards.....	Number.....	88	648
Corrals.....	Number.....	28	371
Bridges.....	Number.....	19	322
Truck trails (minor roads).....	Miles.....	620	9, 266. 5
Stock trails.....	Miles.....	104	1, 260. 3
Permanent check dams.....	Number.....	676	8, 141
Temporary check dams.....	Number.....	1, 938	49, 873
Water control structures other than dams.....	Number.....	993	1, 527
Rodent control.....	Acres.....	1, 370, 756	11, 469, 993
Insect pest control.....	Acres.....	307, 376	469, 512
Range revegetation (reseeding).....	Acres.....	199, 670	348, 046
Tree planting, gully.....	Square yards.....	2, 000	11, 580
Diversion ditches.....	Linear feet.....	10, 500	272, 876
Channel construction.....	Linear feet.....	15, 432	27, 973
Water spreaders.....	Linear feet.....	26, 410	179, 915
Clearing and cleaning channels.....	Square yards.....	72, 720	183, 540
Riprap and paving.....	Square yards.....	4, 960	153, 128
Fire fighting.....	Man days.....	9, 538	121, 970

Range Fires.—Due to increased forage growth, curtailment of CCC, and possible increase in subversive activities on the range territory, the fire hazard is of growing concern. CCC enrollee contributions cannot be measured in dollars and cents. In 6 years prior to January 1, 1942, these boys devoted 180,000 man days (500 man years) to range fire control. During the 1941 calendar year alone there were 433 fires in the grazing districts and a total burn of 1,614,000 acres. This destroyed forage that would feed 16,000 cattle or 80,000 sheep one year, representing a loss of 4,000 tons of meat. Grass fires move fast and, without manpower and tools ready for quick counterattack, the results are devastating.

To help meet this situation in the face of reduced manpower, the Service reorganized its fire fighting setup. A fire supervisor, with a small contingent of trained men and with authority to recruit per diem guards and fire fighters subject to call when needed, was appointed in each of the 10 grazing regions and coordinated with the Office of Civilian Defense in accordance with Executive Order No. 9165 of May 15. Cooperation with ranchers, highway patrols, CAA training posts, and other groups for prompt reporting of fires, provided an effi-

cient, widely spread fire detection plan. The sum of \$25,000 appropriated by Congress to control range fire was thinly spread in the regions of highest fire hazard. For the present season the Office of Land Utilization has allotted \$100,000 to the Grazing Service for emergency fire protection.

Civilian Conservation Corps.—Wherever possible CCC work in grazing districts was devoted to war-aid projects. As the number of camps and the size of enrollee strength tapered downward, facilities and equipment were put in shape for military requests. Eight camps finished the year on a full-time war basis, constructing roads to mineral deposits, posting bombing ranges, guarding water supplies, and developing airfields in four States. One side camp, connected with 10 camps in the intermountain area by short wave radio, operated as a central detection service in cooperation with the Office of Civilian Defense. At these stations enrollees kept a 24-hour alert, and some instances of private unauthorized night flying were detected and reported.

Hearings and Appeals.—Of the 326 appeals involving grazing privileges filed during the year, more than half were disposed of by local agreements or by examiners' decisions. Twenty-three grazing cases involving 48 persons were appealed to the Secretary of the Interior during the year. The Secretary rendered 30 decisions on grazing cases during the year.

Consolidation.—During the year a chief counsel was attached to the Office of the Director to coordinate and to integrate legal matters with the Office of the Solicitor. Full cooperation was had with other agencies of the Department on a multitude of interlocking problems which required legal interpretation. The work of the Engineering, Inspection, and Safety units and the Range Surveys unit, formerly operating as field units at Salt Lake City, also was consolidated in the Office of the Director.

Funds and Personnel.—Administrative funds provided by Congress, including per diem and travel for district advisers, totaled \$800,000 for the fiscal year. Other funds allotted and contributed for soil and moisture conservation work; for construction and maintenance of range improvements; for protection against range and forest fires; for leasing of Pierce Act grazing lands, and for CCC camp operation, totaled \$2,778,329.94.

Salaried employees totaled 658 on June 30, a net decrease of 482 during the year, due primarily to abolishment of CCC camps, military furloughs, and transfers. Ninety-six employees entered military service, 46 transferred to war agencies, and others resigned to work in war production plants.

Grazing Fees.—Earned grazing fees in the 10 States totaled \$899,962.12 during the year, bringing the total so earned since 1936 to

\$4,567,456.71. Except an item of \$1,382.21 deposited to the credit of Indians in certain grazing districts, one-half of the 1942 earned fees (\$449,289.94) is shared by the 10 States in proportion to the amount users paid in those States as follows: Arizona \$25,909.48, California \$9,818.38, Colorado \$29,636.80, Idaho \$55,291.21, Montana \$33,494.08, Nevada \$80,307.22, New Mexico \$52,646.44, Oregon \$26,392.00, Utah \$69,908.40, and Wyoming \$65,885.93. To date, the States mentioned have shared in earned grazing fees to the extent of \$2,262,711.69. In turn they have contributed \$421,191.04, to be used under State laws for range development work specified by the stockmen's advisory boards. In the 1942 fiscal year \$68,621.22 was contributed for such purposes. This is commonly referred to as the 50 percent fund.

Equipment.—Much heavy CCC equipment was transferred to the Army Quartermaster and some was delivered to central repair shops. Certain units were later loaned back to the Grazing Service for fire protection and access road construction, thus placing the Grazing Service in a fairly good position with equipment to conduct pressing emergency work.

Whenever possible, travel was made by common carrier. When absolutely necessary to travel by automobile, pool trips were arranged within the Service itself and a plan worked out with other Interior Department agencies in the West for interbureau pooling of automobile travel when feasible. Strict accountability was placed on drivers and mechanics to maintain rigid inspection and upkeep standards, to reduce accidents, conserve fuel, rubber, and rolling stock.

Job Load Analysis, Audit, Inspection, and Training.—Job load analyses, based on 31 primary grazing district activities, revealed a much greater work load than the present force can possibly accomplish.

A system of proprietary accounting was installed at the beginning of the year and all business transactions of the Grazing Service were reviewed, resulting in improved fiscal and property records in the districts. Reduction of the auditor force, leaving only one such employee in the Service, slowed down this important phase of the work.

Training at CCC camps consisting of on-the-job instruction involving machinery, tools, drafting, and specialized classroom work equipped thousands of enrollees for effective front line and supply line duty. A 3-week field conference of 37 key district men featured training-in-service.

Status of Grazing Districts.—One additional district was established during the year, bringing the total to 58, with an approximate gross area of 264,600,000 acres. Vacant public land in grazing districts totalled 133,419,100 acres. Sixty-two modification orders resulted in additions to grazing districts of 1,995,000 acres and the elimination of 2,252,000 acres from districts. About 93,000 acres were added to districts by orders revoking stockdriveway withdrawals created by

other public land laws. A breakdown of grazing district areas by States is shown on table 3.

TABLE 3.—Acreages in grazing districts, June 30, 1942

State	Number of districts	Gross area	Vacant unappropriated public land	Other public land	Total administered by Grazing Service	Other land
Arizona	4	18,171,400	10,067,100	719,900	10,787,000	7,384,400
California	2	8,050,300	2,869,700	812,400	3,682,100	4,368,200
Colorado	8	15,903,700	7,190,200	643,600	7,833,800	8,069,900
Idaho	5	21,867,600	11,000,000	762,200	11,762,200	10,105,400
Montana	6	31,968,700	4,555,100	923,800	5,478,900	26,489,800
Nevada	5	48,560,200	34,466,800	549,700	35,016,500	13,543,700
New Mexico	7	39,747,400	14,506,200	684,400	15,190,600	24,556,800
Oregon	7	20,346,500	12,245,100	148,300	12,393,400	7,953,100
Utah	9	37,487,800	23,582,700	2,142,900	25,725,600	11,762,200
Wyoming	5	22,506,100	12,936,200	1,092,900	14,029,100	8,477,000
Total	58	264,609,700	133,419,100	8,480,100	141,899,200	122,710,500

Office of Land Utilization

LEE MUCK, Assistant to the Secretary

THE Department of the Interior is charged with the administration of a vast national estate and although about 12,000,000 acres are withdrawn for military purposes during the fiscal years 1941 and 1942, there are still under the jurisdiction of the Department approximately 275,000,000 acres in the continental United States and 350,000,000 acres in the Territory of Alaska. The condition of these lands, including the resources thereon, is highly variable, ranging all the way from open grazing areas to primeval forest and from bare desert to scenic masterpieces.

The state of extreme diversification which exists has resulted in a correspondingly wide range of aims and purposes and has created a situation which requires a high degree of coordination if a unified conservation policy is to govern the administrative management of the estate. In recognition of the necessities in this connection the Office of Land Utilization was established as a unit of the Office of the Secretary under date of April 15, 1940.

The Office of Land Utilization is charged with the responsibility of securing the cooperation of the action agencies and the correlation of their functions, programs, and activities in the field of resource management. It supervises the expenditure of departmental conservation appropriations and exercises the fiscal control incident to such supervision, including the preparation of estimates, the presentation thereof to the Bureau of the Budget and to the Congress and the allotment of funds to the bureaus and agencies concerned with soil conservation and emergency protection programs.

Activities Reoriented

Before the fiscal year 1942 had reached its median point, the Nation was shocked by the attack upon Pearl Harbor by the Japanese Imperial Government and the consequent declaration of war by the American Congress. This necessitated a reorientation of the activities of

the agencies in the Department of the Interior having control or supervision over natural resources. Fortunately the steps toward reorganization, cooperation, and correlation that had already been taken were such as to facilitate a prompt and effective meeting of the new problems encountered. Without endangering gains already made, or in any way compromising the conservation aims of the Department, the Office of Land Utilization has, during the last half of the fiscal year 1942, given first attention to directing coordinated land-management programs so as to increase timber production and to augment the quantity and quality of products from the western range lands under the administration of the Department of the Interior. Increased amounts of timber, food, minerals, and other raw materials are now flowing directly into war channels from forest, range, and other types of land under the supervision of the Department of the Interior.

In recognition of the requirements of the war emergency, action has been taken toward the restriction of developmental activities to those that are urgently essential to a maintenance of existing values and to the highest possible contribution to the effective prosecution of the war. Emphasis is being placed upon projects that will contribute directly and substantially to the accomplishment of military objectives. The funds available for forest and range purposes are being devoted primarily to the protection of existing resources, and the development of those that will serve the imperative current needs of the Nation. Many improvements that are recognized as desirable on public lands, national parks, reserves for wildlife, and Indian reservations will be deferred until after the war has been won.

Soil and Moisture Conservation Operations

The President's Reorganization Plan No. 4 transferred the functions of the Soil Conservation Service of the Department of Agriculture with respect to operations conducted on lands under the jurisdiction of the Department of the Interior to the Department of the Interior effective July 1, 1940. The transfer imposed new and enlarged obligations upon the latter Department. However, it was a logical development in the plan of the President to establish definitive fields of responsibility in Federal administration. The coordination of the soil and moisture conservation activities of the Department was assigned to the Office of Land Utilization, and field operations were placed under the direct supervision of the action agencies.

The soil and moisture conservation program of the Department of the Interior had been fully organized and was well under way by the end of the fiscal year 1941. Governing policies and procedures had

fully laid down; practical project plans formulated and approved; and a competent technical staff placed in charge of field operations. An appropriation of \$2,178,700 was authorized for the fiscal year 1942 and since this was only slightly less than the amount made available for the preceding year, operations were continued for the first 6 months in accordance with the plans formulated during 1941. Promptly after Pearl Harbor, however, the soil and moisture conservation program was modified; the acreages included in project areas were reduced; and operations were restricted to those which would produce prompt results. The primary purpose of this streamlining process was to limit work to those projects which would give immediate results (1) by actually increasing livestock production, and (2) by reducing siltation, flood damage, or other adverse conditions affecting irrigation projects or strategic facilities which might adversely affect production.

Special emphasis was placed upon projects which would increase production. Range reseeding, small water developments, water recharging, vegetative gully control, and similar projects that are low cost, and require the use of local materials, were the principal types of work engaged in during the year. Soil and moisture conservation operations such as these helped to increase the forage resources of the range without taking from industrial projects the critical materials urgently needed in the production of equipment and facilities of primary importance in the war program.

Past conservation programs on range lands under the jurisdiction of the Department of the Interior, coupled with the simplified but highly productive program carried out in the fiscal year 1942, not only insured better and higher production of range products for war but guaranteed continued protection of the publicly owned range lands from overuse and misuse during the period of hostilities.

Close cooperation was maintained by field offices throughout the year 1942 with local soil conservation districts. A cooperative agreement for use by the land-management bureaus of the Department and local soil conservation districts was formulated. These cooperative agreements, when entered into between the bureaus of the Department and local soil conservation districts, provide for conducting correlated programs of soil and moisture conservation on public and private lands within such conservation districts. Cooperative relationships were greatly strengthened through the declaration of a joint policy by the Department of the Interior and the Department of Agriculture. This policy statement set forth the broad principles for initiating and carrying out simplified soil and moisture conservation operations on an integrated basis on both public and private lands.

Forest Conservation and Development

The forest resources under the jurisdiction of the Department of the Interior are so strategically situated and so well developed to make substantial contributions to the prosecution of the war. These resources are in a position to furnish large volumes of forest products during the existing emergency, and the administrative agencies in charge of development have been so organized to meet the substantial increase in demand which has developed. New forest management plans devised and put into practical application by the Oregon and California Revested Lands Administration, a division of the General Land Office, and the Forestry and Game Division of the Office of Indian Affairs, timber cuts have been substantially increased to help fill the Nation's war demands for forest products.

Immediately following the entrance of the United States into the present conflict, the Department of the Interior set up a production goal of over 1 billion feet b. m. of timber from the Oregon and California revested lands and from Indian forests for the year 1942. Timber cutting rates were increased immediately and the sale of additional timber was authorized from both Indian lands and O. and C. lands.

During the fiscal year 1942 a total volume of 456,131,000 feet b. m., having a value of \$1,079,000, was cut from the O. and C. forests. Thus, for the first time the sustained-yield capacity of 500,000,000 feet b. m. per annum prescribed by the act of August 28, 1937 (51 Stat. 874) was approached. The volume cut in 1941 was 383,000,000 feet b. m., thereby reflecting a production increase for the year 1942 of approximately 75,000,000 feet b. m.

One hundred ninety-five new timber sale contracts on the O. and C. lands were completed during the fiscal year 1942 involving a volume of 482,271,000 feet b. m. for which the purchasers agreed to pay a total of \$1,356,820. In the previous year 172 timber sale contracts were completed, involving 493,000,000 feet b. m. and a value of \$1,095,584, reflecting an increase of approximately 25 percent in the value of the timber sold. The cost of administration and production on the O. and C. lands for the year 1942 was \$228,000, which when considered with the cash receipts for that period of \$1,150,000 reflects a ratio of cost to income of about 19 percent.

The sale of timber from Indian forests was also increased substantially during the fiscal year 1942 and the income received therefrom also greatly increased. Stumpage prices were advanced on practically all timber contracts in effect and several new large contracts in the States of Oregon and Washington were executed and approved.

The total income from Indian forest and range lands during

fiscal year ending June 30, 1942 was \$3,378,000 and the cost of administration and protection \$610,000, reflecting an operating coefficient of approximately 18 percent.

Although the production of timber from both Indian forests and O. and C. forests was increased during the year 1942, the development of these resources was conducted in full accordance with the Department's conservation policies and the legal requirements with respect to the application of the principles of sustained-yield forest management. The conservation aspects of good forest management were in no way subordinated to the development program. Thus the forests under Department of the Interior administration are meeting the demands for increased production for war without jeopardizing the forest resources under management.

Programs Related to War

In addition to conducting its regular land-management functions and activities during the fiscal year 1942, the Office of Land Utilization, in cooperation with other bureaus and agencies of the Department of the Interior, was charged with additional authority and responsibility in connection with the supervision of programs related directly to the war.

Under date of August 17, 1941, the Director of the Office of Civilian Defense, acting under a directive from the President, initiated the organization of a Facility Security program in cooperation with the departments and agencies of the Federal Government. The Facility Security program has as its objective the mobilization of existing authorities and nonmilitary forces of the Nation into a well-organized front against subversive action. It also seeks a reduction of danger from fire and other hazards of accidental origin which may possibly disrupt the war program.

The execution of the protection program for strategic resources and facilities was delegated to appropriate agencies of the Federal Government operating in the various resource and facility fields. In this connection 10 facility protection subcommittees were organized, namely: communications, air commerce, highways, railroads, public buildings, timber and related facilities, minerals and related facilities, foodstuffs and storage, power and irrigation water, and domestic water.

The forestry agencies of the Department of the Interior, in cooperation with the Forest Service, Department of Agriculture, have been charged with the prosecution of the timber security program; responsibility for the protection of minerals, including petroleum, has been delegated to the Bureau of Mines and the Office of the Petroleum Coordinator for War; and the Bureau of Reclamation, in cooperation with the Federal Power Commission, has assumed the

responsibility of protecting the power resources and irrigation facilities of the Nation. The Assistant to the Secretary of the Interior in Charge of Land Utilization was designated as the chairman of the Timber and Related Facilities Subcommittee of the Office of Civilian Defense, and acting in that capacity, and under the coordinating authority vested in him by the Department, organized the fire protection program covering the lands under the jurisdiction of the Department of the Interior.

On May 19, 1942, the President issued Executive Order No. 9165 which directed the Office of Civilian Defense to assume responsibility for the development and execution of a program of protective measures against subversive enemies. This order gave authority and impetus to the plans and programs which had already been worked out by the various facility security subcommittees of the Office of Civilian Defense. In fact, surveys had been conducted in the various facility and resource fields and action programs formulated in detail. As a result of the state of completion of the plans covering the timber and mineral fields, protection programs were ready for immediate action upon the enactment of the Sixth Supplemental National Defense Appropriation bill for 1942-43. The bill, which was signed by the President on April 28, 1942, included \$812,000 for the protection of forest, brush, and grasslands under the jurisdiction of the Department of the Interior and \$800,000 for the protection of mineral resources and facilities of the Nation including petroleum. Subsequently an additional appropriation of \$95,900 for the protection of forests was authorized in the Appropriation Act of the Department of the Interior for the fiscal year 1943.

Within a comparatively short period of time after the appropriation had been made available for the protection of forest, brush, and grasslands under the jurisdiction of the Department of the Interior, funds were allotted to the action agencies by the Office of Land Utilization and detailed programs of protection formulated and approved. By the end of the fiscal year 1942 the emergency fire protection program had been fully organized, and for the first time in the history of the Department a comparatively adequate plan of protection for the resources under its jurisdiction was placed in effect.

The emergency protection funds authorized by the Congress made it possible for the Department of the Interior to greatly strengthen its protection organizations on Indian lands, the Oregon and California revested grant lands, the national parks, and the wildlife refuges. Protective measures were also provided for the unreserved and unappropriated public lands under the jurisdiction of the General Land Office. Operations in the continental United States were confined largely to lands situated within 300 miles of the eastern and western coasts and gulfs of California and Mexico by reason of the strategic

importance of these zones from the standpoint of possible attacks from the air. However, attention was also directed to areas of high hazard where accidental or incendiary fires might totally disrupt or temporarily obstruct the progress of the protection programs essential to the prosecution of the war.

Owing to the strategic importance of Alaska, special consideration was given to the large areas of forest and brush land in the interior of the Territory. Adequate funds have never been available for the protection of these vast resources. However, the Sixth Supplemental National Defense Appropriation made it possible to set aside \$200,000 for the protection of these lands and to initiate measures which would provide at least a fair degree of security.

As a part of the emergency fire protection program, plans were completed during the latter part of the fiscal year 1942 providing for the cooperation of the Civil Air Patrol in the protection from fire of forest, brush, and grasslands in the continental United States. The establishment of this service greatly strengthened the programs of the protection agencies and made the Civil Air Patrol available to these agencies for fire detection and the transportation of men and supplies to fires in inaccessible areas. The details of the plan were worked out by the Civil Air Patrol in cooperation with the United States Forest Service, Department of Agriculture, and the Office of Land Utilization and the protection agencies of the Department of the Interior.

The emergency fire protection program of the Nation was further strengthened by the establishment of the Forest Fire Fighters Service by the Office of Civilian Defense in cooperation with the forestry agencies of the Department of the Interior and the Department of Agriculture. The purpose of the organization is to safeguard forest lands and other related facilities and resources and to aid in the prevention and suppression of fires which might endanger such facilities or resources. The Forest Fire Fighters Service cooperates with the Department of the Interior, the Department of Agriculture, State forestry officials and private forest protection organizations in mobilizing the manpower necessary to safeguard forest resources. The organization is being trained by specialists of the various agencies under which they will operate wherever increased manpower is essential for adequate protection. It will assist materially in providing the protection agencies of the Nation with trained manpower.

Another program of outstanding importance to the prosecution of the war, with which the Office of Land Utilization was directly concerned during the fiscal year 1942, was the relocation of Japanese evacuees from the West Coast areas upon lands under the jurisdiction of the Department of the Interior. The Office of Indian Affairs, the Bureau of Reclamation and the Office of Land Utilization cooperated effectively with the War Relocation Authority from the inception of

this undertaking and large numbers of evacuees were relocated upon Department of the Interior lands in Arizona and Oregon. Several other projects for the relocation of evacuees were under consideration at the close of the year and the working out of cooperative agreements and land-use permits by the War Relocation Authority and the Department of the Interior were in process. It is expected that the responsibilities assumed by the Department of the Interior agencies in this connection will be continued for the duration of the war.

National Park Service

NEWTON B. DRURY, Director

THE fact that the Nation is at war and that all resources, material and spiritual, must be mobilized for victory has altered the immediate program of the National Park Service but has given added meaning to its ultimate objectives.

As the situation has declined, many activities have been curtailed or reduced, and the Service has faced the necessity of adapting itself to rapidly changing conditions. It has been possible to give direct aid to the war program through properties and personnel. Uses of park lands not contemplated in peacetime are being undertaken, even to the point of sacrifice of park values where clearly necessary and with no alternative, as part of the cost of victory.

At the same time the stress of war has compelled the Service to re-evaluate its stock of its primary functions and responsibilities. As trustee for some of the great things of America—areas of outstanding natural beauty, scientific interest, and historical significance—the National Park Service has realized its obligation to harmonize its activities with the war, relating to the war, aiding wherever possible, and striving to hold fast to those things entrusted to it—the properties themselves, the organization trained to perform its tasks, and, most important, the uniquely American concept under which the national parks are reserved inviolate for the present and future benefit of all of our people.

In time of war, no less than in peace, the national parks and allied areas have served as havens of refuge for those fortunate enough to be able to visit them. Providing an environment that tends to give relief from the tension of a warring world, the parks are being looked upon as a factor in a program of rehabilitation, physical and mental, that is increasingly necessary as the war progresses. In the past 12 months, July 1, 1941, to June 30, 1942, approximately 650,000 members of the armed forces have visited the parks. Even though the demands of war may sharply curtail use by the civilian population for recreation, Americans will still take pride and courage in the fact that this part of their cultural heritage is being preserved for future enjoyment.

The wisdom of the Nation in preserving these areas is clearly on the American continent today as increased demands upon natural resources are invading and forever changing the natural landscape. The national parks and monuments may soon be among the few places in the world where forests continue to evolve naturally where animal life remains in harmonious relationship to its environment, and where the ways of Nature and its works may still be seen in the original design.

War Activities of the National Park Service

On December 16, 1941, the Secretary of the Interior called upon the bureaus of the Department for "full mobilization of the Nation's natural resources for war . . . upon a basis best suited to serve the military and naval forces without waste, and with a view to seeing that we can of such resources for future generations."

The National Park Service has responded to that call, doing things that came within its functions, endeavoring meanwhile to perform its established tasks, and not looking upon the war period as an opportunity to expand.

In all, 125 permits have been issued by the Department of the Interior to the War and Navy Departments and war agencies to make use of National Park Service lands, buildings, and facilities. These permits have ranged from the installation of directional signs along the coastal areas to the complete assignment during the period of two national monuments—Fort Pulaski in Georgia and Cabrillo in California. The extent and nature of most of these permits of necessity is confidential.

The Paradise section of Mount Rainier National Park was used last winter for training troops in mountain warfare.

At Boulder Dam National Recreational Area, lands for an aerial rifle range, recreational development, and rights-of-way for pipelines to serve the Defense Plant Corporation with water from Lake Mead for the operation of a vital magnesium project were turned over to the Army, Navy, and war production agencies. Temporary emergency permission was given to the Defense Plant Corporation for the removal of salt, necessary in the production of magnesium from Death Valley National Monument.

The Chickamauga and Chattanooga National Military Park accommodates a large Army recreation camp; it also is a training center for the Provost Marshal of the United States Army.

To assist the War Production Board, approximately 40 Service employees were assigned to a pig-iron survey in about 900 foot locations located in New York, Pennsylvania, Ohio, Michigan, Illinois, and Wisconsin.

Immediate steps were taken after the declaration of war to establish lookout and air-raid-warning towers in forested areas and to provide trained crews to combat forest fires and man lookout and patrol parties. Arrangements have been made whereby the observers cooperate with the designated authorities in spotting and reporting fires. The Service has taken part in the formation of emergency organizations in the Pacific Coast States and Montana. Fire drills were conducted throughout the park system for training rangers in forest and building fire suppression, control of incendiary bombs, defense against sabotage and other war hazards, law enforcement, protection of visitors, and conduct of operations under emergency conditions. Emergency organization plans have been developed for each park area.

First-aid courses and ambulance service training have been given practically all areas of the National Park Service. Hospital supplies from Yosemite and Sequoia National Parks were made available to hospitals in the San Joaquin Valley to accommodate patients that were moved from the San Francisco hospitals required for the sick and wounded from Pearl Harbor.

There have been numerous instances throughout the National Park System where the Service personnel were the only sources of scientific information and Government-owned lands, buildings, and equipment were the only readily available facilities. In many small towns and isolated areas Service buildings were used as headquarters for the Selective Service System, Office of Civilian Defense, Aircraft Warning Service, rationing boards, and other public organizations. Direct assistance has been given and is being given to the Army, Navy, Marine Corps, and Coast Guard personnel in providing quarters, packing for troops on maneuvers, and furnishing equipment and supplies that are often required. The knowledge that Service personnel have of the areas under their administration is constantly sought by military authorities. The Army has requested Service landscape architects, engineers, and field men to assist in locating gun emplacements and effectively camouflaging them, and in reporting weather, condition of roads and trails, and accessibility of mountain and densely forested areas.

Army Rest Camps

Early in the spring of 1941 the Army recognized the desirability of providing inexpensive facilities in areas which would be available for use by soldiers on leave or which could be used for a week or two at a time to give men relief from the training grind. Field technicians of the National Park Service were called upon to assist in planning and directing our CCC forces in the construction of Army rest camps.

As the first six camps approached completion, a steadily increasing number of locations were considered and designated by the most of them in or near centers of population and one on the Ozarks Recreational Demonstration Area in Missouri. Three camps with a capacity of approximately 20,000 men were constructed in 23 States and the District of Columbia.

Rest and Relaxation for British Sailors

When the American shipyards were thrown open to the Navy, the British Advisory Repair Mission was faced with the problem of making provision for the crews of these vessels that permit the sailors to get away from the sea for as complete a change of scene as possible. The group-camping facilities in the recreational demonstration areas and five vacant CCC camps were offered to the British Navy through the United States Navy. These areas have been used by approximately 10,000 British sailors who have been accommodated in them for periods ranging from 3 days to 10 days.

Recently the National Park Service has been called upon to select or arrange for additional temporary housing for British crews in addition to the use being made of the recreational demonstration areas. The Service has been able to transfer strategically located CCC camps to the United States Navy for this purpose.

War Use of Park Areas in the Nation's Capital

Adaptation to wartime conditions has been a matter of prime concern to the District of Columbia and the National Capital Parks during the fiscal year. Not only has military occupancy of park areas been arranged, but it has been necessary to construct temporary war buildings in the Mall, West Potomac Park, the President John F. Kennedy Park, the Washington Monument Grounds, and the George Washington Memorial Parkway.

The result of this military need was the withdrawal from public use of approximately 30 percent of the major recreational facilities in the National Capital Parks. The replacement of these facilities at other locations is gradually being accomplished to meet the needs of the increasing population of the Nation's Capital.

Fort Washington, Md., and Fort Hunt, Va., were taken over by the War Department, and the protection of the Washington waterways necessitated closing to public use certain sections of the Chesapeake and Ohio Canal.

Travel to the National Park Areas

Although the National Park Service is accustomed to reporting large annual increases in travel, this year's figures show a decrease of 50 percent from last year, and travel for the month of June 1942, as compared to June 1941, showed a 50 percent decrease. However, an impressive total of approximately 16,030,000 visitors, including an estimated 650,000 members of the armed forces, visited the Federal park areas between July 1, 1941, and June 30, 1942, approximately 10,000 of whom were visitors after December 1941. The rubber and gasoline shortages, the need of conserving transportation equipment for use by the military and war agencies, and the limited vacations of workers in war industries made advisable the curtailment of motion of park attendance not only by the National Park Service but also to a large extent by the park operators. Two meetings of representatives of the park operators were held with the Director after the declaration of war. Insofar as was consistent with the changing war program and the position taken by higher authority, it was agreed that the parks would remain open and public-service facilities would be made available to provide accommodations for the people who are able to visit the parks. Special reduced rates were continued in effect for members of the armed forces. The park superintendents were delegated authority to adjust rates and services to meet the rapidly changing war conditions.

Analysis of the travel figures since the outbreak of war shows that while the number of visitors decreased the per capita day use of park areas increased. Most of the people who were able to visit the parks and monuments remained for a longer period than in previous years. In accordance with orders from the Office of Defense Transportation, all sightseeing and charter bus service was brought to a close in the national parks and monuments. Transportation from rail and bus terminals to established destinations such as the hotels and lodges within the parks has been maintained.

Visitation to Hawaii National Park, Hawaii, and Mount McKinley National Park, Alaska, was stopped by the outbreak of the war. The superintendents of those areas and their staffs, however, continued to protect them, to assist with local civilian defense programs, and to make park features available to the members of the armed forces and civilians in the vicinity.

National Park Concessions, Inc., the nonprofit distributing corporation authorized by the Secretary of the Interior in 1941 to operate public facilities at Mammoth Cave National Park, Ky., completed a year of successful operations. One concession unit was established at the Blue Ridge Parkway and plans are being made for the post-war

As the first six camps approached completion, a steadily increasing number of locations were considered and designated by the Army, most of them in or near centers of population and one on the Lake of the Ozarks Recreational Demonstration Area in Missouri. Thirty-three camps with a capacity of approximately 20,000 men were constructed in 23 States and the District of Columbia.

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operation of facilities by this corporation along the entire length of the parkway.

Travel Bureau Operates on War Basis

The program of the Travel Bureau—established by Congress in 1940 and placed under the supervision of the National Park Service—was revised to eliminate promotion of travel. The field offices in New York and San Francisco were closed. A small force is continuing in Washington to serve as a liaison agency in supplying essential information to the travel industry, to war agencies, and to the public. The travel interests of the country, in collaboration with the Bureau, set up the North American Travel Conference, the keynote for which was the utilization of available recreational travel facilities to keep war workers and the public fit for their patriotic duties. This conference first promoted the idea of staggered vacations which later was established as an official policy. Through the Interdepartmental Committee in Cooperation with the American Republics in forwarding the Good Neighbor Policy, and under an allotment of \$25,000 from that committee, the Travel Bureau, assisted by the Photographic Section of the Division of Information, scored 12 reels of film in Spanish and Portuguese for distribution by the State Department to the American Republics.

Problems of Protection Growing Out of the War

In connection with the war program there have arisen proposals to open national park areas to lumbering, mining, grazing, and other commercial exploitation. These present a problem of major importance. The National Park Service is aware that the cost of victory in this war is going to be high and that our natural resources are going to be called upon more and more to meet the shortages in available strategic materials. It is the responsibility of this Service to measure the degree to which the justified needs of the Nation require destruction of irreplaceable national park values and to recommend accordingly. Inconvenience to park administration and to park visitors or remediable damage to park property have not been considered sufficient reasons for questioning the use of park resources for war purposes. Only where uses proposed would do irreparable damage and entail destruction or impairment of distinctive features and qualities in the parks have we felt justified in raising the question as to whether all reasonable alternatives have been exhausted before invading the national park areas. Critical necessity rather than convenience should, we believe, be the governing reason.

This test applies, for instance, to such proposals as that for the logging of airplane spruce in Olympic National Park. The shortage of Sitka spruce for airplane manufacture is recognized as a direct threat to perpetuation of these forests in Olympic National Park. This area has served its highest public use by preserving for the enjoyment of future generations a representative remnant of the vast virgin forests that once were the glory of the Pacific Northwest. Once gone, an outstanding natural spectacle is lost to America forever. The consensus of conservation leaders is that none of the virgin forest in this park should be cut unless the trees are absolutely essential to the prosecution of the war, with no alternative, and only as a last resort. Other spruce should first be used. Supplies from Alaska and from Washington and Oregon are being made available for this purpose, and the Service is cooperating in the provision of some airplane spruce by modifying the taking lines of the Coastal Strip and the Queets Corridor Parkway adjoining Olympic National Park. The Service is following the situation closely, and at each turn of the war program we shall take a position dictated by paramount national need.

Similarly with proposals to mine strategic minerals in the national parks and monuments, the position has been taken that invasion of a national park by mining can be justified only to furnish strategic or critical minerals indispensable to the war and not obtainable elsewhere. In general, studies indicate that strategic minerals are not present in national park areas in sufficient quantities to be of economic importance, but the Service, in collaboration with the Geological Survey, stands ready to aid in determination of the Nation's highest interest in the matter of sacrifices necessary to provide war materials.

The long-range departmental policy of eventually eliminating grazing from all national parks and monuments has been reaffirmed. Land-management studies prove that a small acreage of cultivated pasture is equal to many thousand acres of mountain grazing. The ruinous erosion caused by overgrazing and the spoiling of mountain meadows and streams and serious conflicts with recreational use—all are ample justification for not permitting grazing within the national parks and monuments. Destruction to roads, trails, and improvements by trampling, and the expense of developing water, fences, and other facilities would render such proposed grazing uneconomical; therefore, it has been held that any extension of grazing in aid of the demands caused by the war should be made only after all other possibilities have been exhausted.

In these and other cases where destructive uses of national park lands are proposed for war purposes the Service does not take a hide-

bound position, but rather one of full attempt to cooperate with the military authorities in determining whether the need is critical for the Nation or merely convenient for some individual operation, and whether the need can be met expeditiously somewhere else without destruction of the qualities of the national parks.

Protection of Cultural Resources

Through representation on the President's Committee on the Conservation of Cultural Resources; by surveying and recording materials of cultural, scientific, and historic importance in its possession; by storing irreplaceable items at places which are considered safer than their original repositories; and in the preparation of the handbook issued by the committee, chapter 4 of which on the protection of historic buildings is almost entirely the work of members of our staff, the National Park Service has aided this important phase of civilian defense.

Members of our staff are alert and prepared to protect historical, scientific, and other irreplaceable exhibits that have been entrusted to our care. The Service has cooperated with Federal, State, and local agencies and has worked with the Committee on the Conservation of Cultural Resources, the Office of Civilian Defense, and the Public Buildings Administration in developing plans for the protection of historic buildings and cultural materials.

Public Use of Historic Sites

In recognition of the fact that a nation without physical reminders of its past heroism and military exploits would have little enduring national pride, the Service not only kept its historical areas open as in normal times, but also lengthened the hours of visitation and extended and improved its interpretive programs. Close proximity of these areas to Army and Navy centers provided many soldiers, sailors, and marines with opportunities for recreation and patriotic stimulation, and special programs were arranged for them by National Park Service personnel.

Much was done to perfect and intensify the basic contribution of the historical and military parks to the strengthening of morale. Special theme studies were undertaken to redefine and fortify the National Park Service interpretation of the great movements and crises of American history. Interpretive statements were reexamined and in many cases revised to show how each historical area is an integral part of the theme of the building of America.

On Guard in the Nation's Forests

The agencies in charge of the Nation's forests face perhaps the most critical fire season in history. The National Park Service is cooperatively with the U. S. Forest Service and with State and conservation agencies. Acute threats of sabotage and incendiarism increase the normal protection problem—always a serious one—and it is further intensified by reduction in available manpower for prevention and suppression activities.

The loss of the Civilian Conservation Corps on June 30 and the withdrawal from the forested areas of large numbers of trained fire fighters seriously complicated the fire-protection program. Immediate steps were taken to locate sources of local labor and to train every available Civilian Conservation Corps employee in the essential elements of combating forest fires. Civilian public service camps, composed of conscientious objectors, were able to do effective work in combating a large forest fire in the vicinity of the Blue Ridge Parkway. Plans of the Selective Service Administration for locating additional camps of this type in forested areas are under way.

During the 1941 season, lightning caused more fires than in any other year of record—over one-third of the 540 forest fires reported in parks. A total of 3,788 acres of forest and brush lands were burned throughout the entire system. In addition, 25,000 acres of woodland in the Lava Beds National Monument were burned over by lightning-caused fires.

Although fires started by careless smokers continue to be the most prevalent of the human causes of forest fires in the national parks, the intensified fire-prevention program has given encouraging results in that the total number of preventable man-caused fires has not increased in proportion to park use.

Measured by acres, the park forests represent a relatively small part of the forested area of the United States and its Territories. Nevertheless, aside from the aesthetic value, strategic location makes them of great significance to the Nation. Situated primarily on mountain peaks and in high country, their preservation is essential to the protection of watersheds vital to water supply, agriculture, and power.

Protection Against Forest Insects and Diseases.

The forest insect situation in the National Park System is favorable because of thoroughness of previous intensive control programs. A limited outbreaks still require control work. Continual vigilance, however, must be exercised to assure recognition of epidemics at an early stage. Regular surveys and prompt control of infestations are of

greater importance now than in normal times because of limited power available.

The white pine blister rust continues to spread among the needle pines. Over a third of a million acres of pine forests in national park areas warrant intensive control work. The program was accelerated during the past year through appropriation of funds. Complete control work has been carried out on 66,793 acres.

Loss of Civilian Conservation Corps Camps

Reduction of the Civilian Conservation Corps during 1942 and its abolishment in the 1943 fiscal year as a wartime economy measure caused the National Park Service a serious loss of manpower. In 1933 the Service has depended to a large extent upon the CCC men to fight forest fires, maintain trails, install recreational facilities and carry on general measures of conservation and protection. In the reorganization of regular Service personnel has been necessary to establish the basis on which many of these protective functions will be conducted in the future.

The number of CCC camps under the technical supervision of the Service was reduced from 262 in July 1941 to 91 by June 30, 1942. Throughout the year as camps were required they were assigned to Army and Navy areas. In the Hawaiian Islands, the corps as a whole was allocated to war projects. The St. Thomas camp in the Virgin Islands was discontinued early in the year as defense work precluded employment for all available youth.

By the end of July 1942, all of the CCC camps will be terminated, bringing to a close a 9-year cooperative program that has been of inestimable value in park development and protection. Although this will be reported upon in the 1943 report, we now salute the CCC and acknowledge the aid the National Park Service has received from CCC activities throughout the Nation.

Construction Work Deferred

Along with other civilian agencies of the Federal Government the National Park Service has virtually halted all construction and development for the duration of the war. New work was deferred as reductions were being made even before mandatory restrictions were issued by the War Production Board. Many members of the Service engaged in planning and construction joined the armed forces or other agencies. The Service has made its shift to a war basis for the duration with little difficulty.

The suspension of construction activities affords an excellent opportunity for careful and thorough formulation of plans for future development.

nucleus of the planning branches is being retained in each of the national headquarters and the Director's office. The first call on the services of these employees will be to meet emergency conditions that may arise. The remainder of their time will be devoted to a "plans-on-shelf" program, which the Service has been instructed to prepare. This should prove to be an important element in any accelerated planning program that may be decided upon to take up the slack in employment that may well be anticipated at the end of the war. This will also assure mature and sound plans for any future program of development. The benefit of a "breathing spell" in the matter of construction and development is recognized by the Service.

Parkways

The National Park Service and Public Roads Administration are drafting a long-range plan for resuming development of the Blue Ridge and the Natchez Trace Parkways after the war. The Blue Ridge Parkway ultimately will connect the Shenandoah National Park in Virginia and the Great Smoky Mountains National Park in North Carolina and Tennessee, a distance of 484 miles. Appropriations and allotments to date for the Blue Ridge Parkway have totaled \$1,518,047.33, and more than two-thirds of the total mileage has been completed, with one continuous stretch of bituminous surfaced road between Adney Gap, near Roanoke, Va., and Deep Gap, near Bowling Rock, N. C., a distance of 150 miles.

On the Natchez Trace Parkway, which follows the general location of the Old Indian Trail between Nashville, Tenn., and Natchez, Miss., known as the "Natchez Trace," some work is being completed under contracts issued prior to the war, and as the present construction proceeds to a close 37 miles have been graded and surfaced out of a total of 145 miles, and 83 additional miles have been graded.

Master Plans

As a basis for the planning program of the national park and monument areas, a Master Plan Manual was issued for the guidance of administrative and professional employees of the Service. The Master Plan is the controlling document which governs the orderly development of all areas administered by the National Park Service. Its purpose is to assure the soundness of that development and to coordinate the thought and effort of all persons engaged in establishing the policies which govern an area's preservation, interpretation, administration, and operation. During the 1942 fiscal year, the Service brought to completion and approval master plans for all 166 units of the National Park System. Based on these, development

programs were submitted to the National Resources Planning Board as a basis of the 6-year advance plan and program of Public Works construction submitted annually.

Interpretation

An "inventory of values" describing the outstanding features of each area and defining the significance of those features in relation to human experience has been prepared for many of the natural and historical areas of the Service. These inventories are the result of collaboration and research of various technicians, and serve as the basis for interpretive statements for each area. They are of particular importance in the master-planning program.

Soldiers, sailors, war workers, and civilian visitors to the national parks and monuments were given an opportunity to gain a better understanding of the inspirational, historical, and educational significance of these areas through the guided trips and illustrations given by the naturalists and historians, and the field museums operated by the Service.

Interpretive activities were cut to a war pattern. Guided tours calling for the use of private cars (frequently referred to as "car trips") were practically eliminated, and scheduled hiking trips were curtailed. The Yosemite School of Field Natural History, which for many years served as a training ground for naturalists, and the Yosemite Junior Nature School were discontinued for the period of the war.

Many technical, semitechnical, and popular publication periodicals were postponed or suspended indefinitely to avoid the expense of paper and printing facilities needed for emergency work and to avoid possible personnel reductions. The preparation of a series of interpretive programs was abandoned, as were the monthly "clip sheets" and "bulletins" with phases of conservation in popular vein.

Museums

Museum exhibits have been directed toward the primary purpose of each area in strengthening patriotic thought. One typical example, "What We Fight For," was installed at the historical museum at Morristown National Historical Park. It presented in graphic form the ideals of freedom of worship and freedom of speech as expressed by George Washington.

The Western Museum Laboratories in California closed at the termination of Work Projects Administration programs, and the preparation of museum exhibits has been curtailed throughout the Service.

Among the acquisitions of scientific and historical materials

the Wirt Robinson Indian Collection which was installed in the museum on Jamestown Island section of Colonial National Historical Park, and the John Nelson Collection of objects relating to the prehistoric Indians who lived in the vicinity and visited the Mammoth Cave, which were gathered over a long period of years by John Nelson, a former cave guide, and were purchased by the Mammoth Cave National Park Association and donated to the park. They will form the basis for an interpretive museum exhibit and study material.

The Advisory Board

The Advisory Board on National Parks, Historic Sites, Buildings, and Monuments met twice during the year to consider policies involved in the preservation and use of national park and monument areas during the war. The interest of this Board and their helpful recommendations to the Secretary are of great value to the Service. The members are: Edmund H. Abrahams, chairman; Dr. Clark Wissler, vice chairman; Dr. Frank M. Setzler, Secretary; and Dr. Thomas Barbour, Dr. Herbert E. Bolton, Mrs. Reau Folk, George deBenneville Keim, Dr. Fiske Kimball, Dr. Waldo G. Leland, Richard Lieber, and Charles G. Sauers.

Archeology

The National Park Service in collaboration with the Bureau of Reclamation, Office of Indian Affairs, Tennessee Valley Authority, and Work Projects Administration reviewed, investigated, and conducted many important archeological studies. Typical of these was the archeological reconnaissance and obtaining of scientific data relating to the little-known period of cave habitation belonging to the early Basket Maker development from the Yampa and Green River drainage basins in Dinosaur National Monument, soon to be inundated by project dams and reservoirs, and, also, the salvaging of important archeological data and collections at Mancos Canyon, near Mesa Verde National Park. By the end of the fiscal year, archeological programs under the Work Projects Administration on which this Service and the Smithsonian Institution have given technical review were greatly reduced, and all excavations on national park areas were brought to a close.

Wildlife Conservation

The National Park Service continued its cooperative relationships with the Fish and Wildlife Service on important wildlife problems. Recognizing that the sight of animals, large and small, in their natural

habitat is an integral part of the American scene as exemplified in the national parks, efforts were directed toward wildlife management in its broad phases.

During the past year wildlife experts recommended reductions in the number of so-called "big game" and the fur-bearing animals, in order to relieve overpopulation of the range and guard against deterioration of these animals through starvation and disease that accompany continuously overstocked ranges.

The greatest problems occurred in Yellowstone National Park, which contains the largest mammal population of any unit in the system. Although the winter range which is shared by elk, deer, antelopes, and bighorn showed some improvement, this was due primarily to weather conditions, particularly mild winters that made it possible for the big animals to graze in the high country, thus relieving the regular winter range of its usual grazing burden. To prevent further jeopardy of the range, and guard against wildlife disaster in an unexpectedly severe winter, it is necessary to reduce the large existing elk surplus and maintain the herd at less than carrying capacity until the range has fully recovered.

A too-large bison population is another Yellowstone problem. During the year a program was inaugurated for reduction of the Lamar bison herd leading to its eventual establishment on a self-sustaining basis. In all 183 bison were disposed of to Indians, relief agencies, and the San Rafael Grazing District, Utah.

Elk, deer, and beaver in other areas were reduced, some being used for stocking purposes on non-Federal areas.

A comprehensive analysis of grazing by saddle stock in Kings Canyon National Park was prepared as a basis for a protective program for meadows and open areas and to insure proper watershed and wildlife forage.

To assist in rendering the Hawaiian Islands as nearly self-sustaining as possible, grazing was authorized on Hawaii National Park lands found adaptable therefor.

Fish Conservation

Heavy plantings of fish were continued, with the release of 22 million fish (eggs, fry, fingerlings, etc.) in waters of 20 park areas. Most of the planting stock was supplied by Fish and Wildlife Service hatcheries. Rearing pools were operated by the National Park Service in Great Smoky Mountains, Rocky Mountain, and Sequoia National Parks.

A uniform series of cooperative agreements was entered into between the Service and the California Division of Fish and Game governing fish-stocking procedure for each of the national parks in California.

In addition to these annual agreements, a general policy agreement was reached between the National Park Service, Fish and Wildlife Service, and California Division of Fish and Game.

Soil and Moisture Conservation

In accordance with the program of the Department's Office of Land Utilization, much important work was accomplished in soil and moisture conservation, particularly in the Southwest.

The engineering laboratory of the Service made soils and building material analyses. Architectural concrete researches were made to determine effect and weathering quality of integral colored pigments and surface stains of importance in camouflage. Continued assistance was given the Bureau of Yards and Docks of the Navy Department, both in performance of tests and in the use of laboratory facilities by naval personnel. In collaboration with the National Bureau of Standards, further investigations were made of cement-stabilized soils.

Sanitation and Safety Precautions

Close cooperation was continued with the Public Health Service in maintaining proper sanitation conditions throughout the National Park System. Sanitary engineers of the Public Health Service inspected water supplies, sewerage and sewage disposal, garbage disposal, camp and picnic grounds, swimming pools, and food-handling places throughout the system. No critical problems of sanitation arose.

In-Service training courses in fire-protection engineering were given groups of selected engineers and architects, to familiarize the personnel with the principles and safe practices of fire protection as they apply to the design, construction, and operation of building and auxiliary equipment.

The trend of employee accidents continued downward, with a reduction of more than 70 percent in the compensation costs for employee injuries since the establishment of a safety unit in the National Park Service in 1937. This record is especially noteworthy since for the 5 years preceding 1937 there was a rising trend of employee injury costs.

Cooperation in State Park and Related Development

Early in 1942 the Service published its report on A Study of the Park and Recreation Problem of the United States which was based to a considerable extent upon information obtained through the various

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At meetings in Mexico City, representatives of the United States and Mexico made recommendations to carry out the act of August 18, 1941, authorizing the establishment of the Coronado International Memorial on the international boundary between the States of Arizona and Sonora.

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The necessary number of Governments ratified the convention during the past year, and it came into force on April 30, 1942. The treaty establishes conservation principles that will be of great value in preserving the natural conditions, birds, and animals of the Western Hemisphere.

The National Park Service has exchanged information with the Cultural Relations Division of the State Department and the Hispanic Foundation of the Library of Congress concerning legislation, classification, protection, and treatment of historic sites. Representatives of Brazil, Peru, Colombia, and Guatemala visited Washington and a number of the national parks to study park operation, stabilization methods, legislation and administrative methods used, and archeological conservation.

Great Britain now is making plans for nature preservation in its post-war construction, through its municipal corporations and scientific societies.

At meetings in Mexico City, representatives of the United States and Mexico made recommendations to carry out the act of August 18, 1941, authorizing the establishment of the Coronado International Memorial on the international boundary between the States of Arizona and Sonora.

Additions to the National Park System

One new national monument was established during the past year, bringing the total number of units of the National Park System to 166. This new unit and additions to existing units increased the total area of the system to 21,686,029 acres.

The Andrew Johnson National Monument, with a total area of 17 acres, was established by Presidential proclamation of April 27, 1942, pursuant to the act of August 25, 1935. The State of Tennessee donated the Andrew Johnson Tailor Shop property at Greeneville, where the former President engaged in his trade from 1826 to 1843;

State park, parkway, and recreational area studies. Its greatest value will be in planning future programs, especially during the post-war period.

The total of State reports was increased to 36 with the completion of those for Vermont and West Virginia.

Regional park and recreation studies of New England and the Central Southeast, launched in the preceding year, were suspended for the duration. A long-range study of the recreational resources of the Denison Dam, Texas and Oklahoma, was initiated under a special congressional appropriation. The 1940 quinquennial survey of county and municipal parks, conducted in cooperation with the National Recreation Association and the American Institute of Park Executives, was completed.

The reduction in the number of Civilian Conservation Corps camps throughout the year, and the redirection of CCC work to activities contributing directly to the protection of vital resources and to the military effort, resulted in virtual elimination of State, county, and metropolitan park projects.

All States that had benefited from this cooperative enterprise were advised, in anticipation of some form of Federal assistance when the war is ended, to work along three main lines: (1) perfection of their administrative and technical organizations; (2) building up their land ownership, particularly to round out existing parks; and, (3) continued preparation of adequate plans for future development.

Drainage Basin Activities

An important part of the Service's cooperative planning work during the year was the study of the recreational resources of the various drainage basins throughout the country. This is a part of the continuing program of drainage basin studies carried on by Federal, State, and local authorities under general auspices of the National Resources Planning Board.

Contributions of planning advice through regular attendance at drainage basin meetings were made in connection with the current studies in a number of other basins throughout the country. Despite loss of personnel Service representation continued on all drainage basin committees.

A plan for the utilization of the recreational resources created by development of the Grand Coulee Reservoir in the State of Washington was completed and turned over to the Bureau of Reclamation. The work was done at the request of that bureau as a part of the complete analysis of the project's resources and possibilities. A start was made on similar planning for the Central Valley project in California.

In cooperation with the Bureau of Reclamation, as a part of the studies to formulate a comprehensive plan for the utilization of the resources of the Colorado River Basin, a recreational survey was in progress throughout the year. Special emphasis was placed upon the most vital water conservation possibilities, suggested by the Bureau of Reclamation at points along the Colorado and Green Rivers.

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the War Department transferred the Andrew Johnson National Cemetery; and the Andrew Johnson Homestead was purchased, bringing together the essential properties for establishment of the monument.

Additions were made to 25 existing units through the purchase of 2,503 acres; the acquisition by donation of 4,285 acres; and the transfer of 28,608 acres already in Government ownership.

Progress of National Park Projects

Consummation of several major national park projects appears possible at the close of the year, and good progress on several others can be reported.

The Big Bend National Park project, launched in Texas over 10 years ago and authorized by the act of June 20, 1935, approaches successful conclusion as the State of Texas acquired title to more than 600,000 acres of land within the proposed park boundaries. Additional purchases are expected to bring the total to approximately 710,000 acres by September 1, after which no further expenditure can be made against the \$1,500,000 appropriated by the State Legislature for that purpose. Land acquisition was handled by the Texas State Park Board. The Republic of Mexico plans to establish eventually a similar national park on the opposite side of the Rio Grande. The two will form an international park on our southern border similar to the Waterton-Glacier International Peace Park on the Canada-United States boundary.

The Everglades National Park project was authorized by act of June 30, 1934. Negotiations with the State of Florida were continued and considerable progress was made during the past year to formulate plans to exchange miscellaneous State lands for privately owned lands within the project boundaries, and the eventual transfer of the lands to the Federal Government. The Governor of Florida has expressed wholehearted interest in this projected park.

Coronado International Memorial, Arizona.—By act of August 1, 1941, the Congress authorized the establishment of a memorial in Arizona to commemorate the explorations of Francisco Vasquez de Coronado. An area of 2,880 acres of land adjoining the international boundary and located about 10 miles west of the town of Nogales has been selected for this purpose. The act provides that a Presidential proclamation establishing the memorial shall be issued when the Government of Mexico has established, or provided for the establishment of, an adjoining area of similar type and size in the State of Sonora.

At a conference held in Mexico City in June attended by representatives of the United States Government and Arizona and the Government of Mexico arrangements were made to survey the area proposed for the memorial in the State of Sonora so that a definite

to be issued by the President of Mexico establishing it as the Coronado International Memorial Park. The uses, functions, development, and administration of the Coronado International Memorial, comprising areas on each side of the international boundary, also were outlined at the conference. This international memorial, when established, will symbolize the unity existing between Mexico and the United States.

Cumberland Gap National Historical Park project, Kentucky, Tennessee, and Virginia, was authorized by act of June 11, 1940. A recent appropriation for land acquisition by the Kentucky Legislature of 50,000 brought this project nearer realization. The State of Tennessee had previously appropriated \$75,000 with which to acquire its portion of the tri-State area. Virginia has completed its surveys and negotiations with funds allocated for the purpose and has indicated that 5,000 will be forthcoming with which to exercise the options.

Cape Hatteras National Seashore Recreational Area project, North Carolina, was authorized by act of August 17, 1937, and redesignated by the act of June 29, 1940. During the past year the Cape Hatteras Seashore Commission has been successful in securing more than 7,000 acres, mostly in lands belonging to the State and to Dare County, for conveyance to the Federal Government. At least 10,000 acres must be acquired before the area, which will include the existing Kill Devil Hill Memorial National Monument, Fort Raleigh National Historic Site, and Cape Hatteras Lighthouse, can be established.

Saratoga National Historical Park project, New York, was authorized by act of June 1, 1938. Title to most of the area was conveyed to the United States by the State of New York in 1941. Options have been obtained on more than one-half of the remaining lands which must be acquired before the park can be formally established.

Encouraging as are the foregoing gains, the Service realizes that effective means have not yet been found to save some unique areas that are worthy of preservation, the status of which is critical. The Caddo River forest in Madison Parish, La., and the Porcupine Mountains forest in northern Michigan are typical examples. In both areas there are priceless remnants of virgin forest in imminent danger of destruction, and there are rare wildlife species which must have adequate sanctuary if they are to survive. The Service is aware, also, of the continuing deterioration of the values in some of its authorized projects, where no systematic program of national park land acquisition has been authorized. Likewise, little progress has been made in the vital matter of acquiring private inholdings in the established national parks and monuments. In the Joshua Tree National Monument, for instance, the private-land situation is such that it prevents the proper development of the monument for public use or the adequate protection of the plant species for which the area is named.

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Reappraisal of Objectives and Classification of Areas

World War II brought to a close a 9-year period of park development that was one of the outstanding phases of the peacetime conservation and employment programs. This finds the National Park Service with enlarged responsibilities and functions. The national park areas now number 166, contain almost 22,000,000 acres, and were visited during the past 5 years by an average of approximately 17 million people annually. To the 26 areas designated by the Congress as "national parks" there have been added other types—national monuments, historical parks, military parks, historic sites, parkways, and recreational areas. Under the CCC, the Historic Sites Survey, and the Park, Parkway, and Recreational Area Study, there has been a widespread program of cooperation with the States. This has of necessity called for more complicated organization, greater personnel, and new policies to meet varying situations and needs. The Service during the past year, therefore, has thought it appropriate to analyze its position, and to redefine and clarify its objectives in the light of changed conditions.

Many members of the Washington Office staff and representatives from the field have collaborated in preparing a statement of objectives. This takes into account the increased complexity of the Service's activities as a result of the emergency program, the added functions that by congressional and executive action it has been asked to assume, and the new types of areas that it has been called upon to administer.

Today, as in the early years, much of the Service's prestige and distinction lie in the fact that it is the Nation's trustee for certain outstanding historic shrines and superlative examples of Nature's handiwork in the United States. It was such areas that the Congress had in mind when the basic policy of administering national park lands was thus stated in the act of August 25, 1916: "To conserve the scenery and the natural and historic objects and the wildlife therein, and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations."

This, the foundation idea upon which the Service is built, is basic today. It provides the unifying element that welds all national park units into a system. Development and use of the areas must follow a pattern that will afford to visitors, without material impairment of the natural and historical characteristics, the deeply satisfying experience that each area is capable of giving.

The Service has also given considerable study to the question of terminology, with the hope that the present unwieldy classification of areas might be reduced and simplified to meet the requirements of common usage.

Officials Receive Pugsley Awards

The three Cornelius Amory Pugsley medals, awarded by the American Scenic and Historic Preservation Society each year for outstanding park achievements, were all given in the national field for 1941 rather than for National, State, and municipal work, as in the past.

The gold medal was awarded to Secretary of the Interior Harold L. Ickes for "Distinguished park service in the national field." Arthur E. Demaray, Associate Director of the National Park Service, was awarded the silver medal for his long and able service in the interest of the national parks; and Miss Harlean James, executive secretary of the American Planning and Civic Association, received the bronze medal for her years of devoted service in the interest of America's parks. Presentation of the medals was made in the office of the Secretary of the Interior on June 4, 1942.

Former Director Cammerer Honored

At the request of the National Park Service, approved by the Secretary of the Interior, the United States Board on Geographical Names authorized the naming of two natural features in Great Smoky Mountains National Park, Mount Cammerer and Cammerer Ridge, in recognition of the distinguished services of Arno B. Cammerer, Director of the National Park Service from 1933 to 1940, and an official of that agency from July 1919 until his death in April 1941 deprived the Service of one of its most valuable members. Mr. Cammerer had a large part in the establishment of Great Smoky Mountains National Park and other eastern national parks; he had guided the efforts of many thousands of employees and had borne the brunt of organizing many new and expanded activities of the Service between 1933 and 1940. Always, he zealously guarded the national parks against over-development in order to retain their significant natural and historic character.

Removal of Service's Washington Office to Chicago

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Office of Indian Affairs, Department of the Interior, to Chicago, Ill., as a part of a program to make additional office and housing space available for the rapidly expanding war agencies. At the close of the fiscal year, the Office of Decentralization Service, Public Buildings Administration, had completed negotiations for the rental of space for the central offices of those agencies in Chicago's Merchandise Mart Building. A small liaison office will remain in Washington to handle matters affecting the National Capital Parks, the District of Columbia Zoning Commission, and the National Capital Park and Planning Commission, and to carry out special assignments for the Director.

Personnel Changes

The war has brought far-reaching changes in the personnel of the National Park Service. The reductions in the CCC throughout the year and its elimination on June 30, 1942, reduced the working organization substantially. Curtailment of appropriations brought further reductions. The move to Chicago made it necessary for many employees to transfer to other agencies.

Over 300 Service employees, regular and CCC, have joined the armed forces, and more than 150 have transferred to agencies primarily engaged in war work.

The Service is proud of those who are making such a worthy contribution to our Nation by joining the ranks of her defenders and of the many who have sought arduous and technical assignments in war production work. We are also proud of the way in which added burdens have been assumed by the existing staff because of the many transfers and reductions in personnel.

Throughout the National Park Service our wartime pledge is to protect for this and future generations the outstanding examples of the American scene entrusted to us, and to administer each area so as to maintain integrity of the purpose for which it was established. We are strengthened in this resolution by your statement that "A Nation like ours at war is inspired to greater efforts by the thought that institutions in which it takes pride, and which symbolize its greatness, are being defended and will exist after the war has been won."

Statistical Tables

This year, with the annual report reduced in length to economize on paper and to relieve the burden on printing facilities, only one table giving the areas administered by the National Park Service, the acreage in each and the visitation is included. Other statistics on the operations of the National Park Service have been compiled for administrative purposes and copies may be obtained from the Director, National Park Service, Chicago, Ill.

National park system, acreage, and visitation

Areas (classification)	Location (State)	Approximate acreage	Approximate visitors, fiscal year July 1, 1941-June 30, 1942	Approximate visitors, 5-year average, 1938-42
National parks:				
Acadia.....	Maine.....	24,629	381,750	395,500
Bryce Canyon.....	Utah.....	35,980	101,000	106,300
Carlsbad Caverns.....	New Mexico.....	49,568	219,250	231,600
Crater Lake.....	Oregon.....	160,334	335,200	255,400
Glacier.....	Montana.....	984,310	156,400	167,300
Grand Canyon.....	Arizona.....	645,120	343,900	375,000
Grand Teton.....	Wyoming.....	96,000	113,150	116,500
Great Smoky Mountains.....	North Carolina-Tennessee.....	457,462	1,183,100	950,500
Hawaii.....	Territory of Hawaii.....	173,399	140,950	235,250
Hot Springs.....	Arkansas.....	1,011	192,550	175,800
Isle Royale.....	Michigan.....	133,839	7,350	13,500
Kings Canyon.....	California.....	454,600	152,900	1105,350
Lassen Volcanic.....	do.....	104,527	95,750	96,600
Mammoth Cave.....	Kentucky.....	49,696	148,100	112,750
Mesa Verde.....	Colorado.....	51,334	36,550	35,500
Mount McKinley.....	Alaska.....	1,939,493	700	1,500
Mount Rainier.....	Washington.....	241,782	399,700	409,325
Olympic.....	do.....	835,411	187,700	98,000
Platt.....	Oklahoma.....	912	250,950	304,300
Rocky Mountain.....	Colorado.....	269,416	422,000	600,800
Sequoia.....	California.....	386,560	262,000	270,000
Shenandoah.....	Virginia.....	193,441	878,100	950,000
Wind Cave.....	South Dakota.....	12,640	19,200	18,700
Yellowstone.....	Wyoming.....	2,221,773	499,600	512,200
Yosemite.....	California.....	761,111	490,500	500,250
Zion.....	Utah.....	86,343	158,100	164,000
National monuments:				
Ackia Battlefield.....	Mississippi.....	49	(¹)	(¹)
Andrew Johnson.....	Tennessee.....	17,08	2,600	1,260
Appomattox.....	Virginia.....	970	15,500	13,100
Arches.....	Utah.....	33,680	2,700	2,500
Aztec Ruins.....	New Mexico.....	26	11,150	15,000
Badlands.....	South Dakota.....	150,103	210,300	1170,000
Bandelier.....	New Mexico.....	26,026	9,700	12,100
Big Hole Battlefield.....	Montana.....	200	3,450	7,500
Black Canyon of the Gunnison.....	Colorado.....	13,969	16,700	17,100
Cabrillo.....	California.....	50	(¹)	1150,000
Canyon de Chelly.....	Arizona.....	83,840	2,100	2,000
Capital Reef.....	Utah.....	37,060	1,050	1,500
Capulin Mountain.....	New Mexico.....	680	33,200	33,750
Casa Grande.....	Arizona.....	473	13,400	20,600
Castillo de San Marcos.....	Florida.....	19	231,950	1232,000
Castle Pinckney.....	South Carolina.....	4	(¹)	(¹)
Cedar Breaks.....	Utah.....	6,067	13,200	16,800
Chaco Canyon.....	New Mexico.....	21,509	1,150	3,400
Channel Islands.....	California.....	1,120	(¹)	(¹)
Chiricahua.....	Arizona.....	10,695	8,300	9,500
Colorado.....	Colorado.....	18,311	22,850	39,000
Craters of the Moon.....	Idaho.....	48,280	14,400	19,000
Death Valley.....	California-Nevada.....	1,907,720	70,000	73,500
Devil Postpile.....	California.....	800	5,125	7,300
Devils Tower.....	Wyoming.....	1,153	37,350	36,350
Dinosaur.....	Utah.....	203,965	6,300	9,000
El Morro.....	New Mexico.....	240	1,150	2,000
Father Millet Cross.....	New York.....	.01	(¹)	(¹)
Fort Jefferson.....	Florida.....	87	720	1,000

See footnotes at end of table.

National park system, acreage, and visitation—Continued

Areas (classification)	Location (State)	Approximate acreage	Approximate visitors, fiscal year July 1, 1941– June 30, 1942	Approximate visitors, 5-year aver- age, 1938–42
National monuments—Continued.				
Fort Laramie.....	Wyoming.....	214	5,450	2,500
Fort Matanzas.....	Florida.....	18	9,600	17,600
Fort McHenry.....	Maryland.....	48	589,350	461,500
Fort Pulaski.....	Georgia.....	5,427	28,800	41,300
Fossil Cycad.....	South Dakota.....	320	(?)	(?)
George Washington Birthplace.....	Virginia.....	394	35,700	49,000
Gila Cliff Dwellings.....	New Mexico.....	160	300	180
Glacier Bay.....	Alaska.....	2,299,520	(?)	(?)
Gran Quivira.....	New Mexico.....	611	2,550	2,750
Grand Canyon.....	Arizona.....	201,291	160	110
Great Sand Dunes.....	Colorado.....	46,034	11,100	10,600
Holy Cross.....	do.....	1,392	435	50
Homestead.....	Nebraska.....	161	1,000	1,500
Hovenweep.....	Utah-Colorado.....	280	50	20
Jewel Cave.....	South Dakota.....	1,275	2,400	3,800
Joshua Tree.....	California.....	837,480	28,500	11,200
Katmai.....	Alaska.....	2,697,500	(?)	(?)
Lava Beds.....	California.....	45,967	27,500	33,000
Lehman Caves.....	Nevada.....	640	3,600	4,200
Meriwether Lewis.....	Tennessee.....	300	19,050	16,400
Montezuma Castle.....	Arizona.....	521	8,450	9,000
Mound City Group.....	Ohio.....	57	(?)	(?)
Muir Woods.....	California.....	425	117,600	128,500
Natural Bridges.....	Utah.....	2,740	450	750
Navajo.....	Arizona.....	350	400	500
Ocmulgee.....	Georgia.....	683	47,600	44,600
Old Kasaan.....	Alaska.....	38	(?)	(?)
Oregon Caves.....	Oregon.....	480	25,350	48,000
Organ Pipe Cactus.....	Arizona.....	330,687	24,450	11,500
Perry's Victory and International Peace Memorial.....	Ohio.....	14	20,975	28,400
Petrified Forest.....	Arizona.....	93,199	189,750	205,500
Pinnacles.....	California.....	14,498	7,500	21,500
Pipe Spring.....	Arizona.....	40	800	1,850
Pipestone.....	Minnesota.....	115	2,250	1,000
Rainbow Bridge.....	Utah.....	160	185	250
Saguaro.....	Arizona.....	63,284	11,250	16,350
Santa Rosa Island.....	Florida.....	9,500	175,200	118,100
Scotts Bluff.....	Nebraska.....	3,476	65,250	86,500
Shoshone Cavern.....	Wyoming.....	212	(?)	(?)
Sitka.....	Alaska.....	57	8,600	16,550
Statue of Liberty.....	New York.....	10	389,700	381,750
Sunset Crater.....	Arizona.....	3,040	11,050	10,100
Timpanogos Cave.....	Utah.....	250	6,850	10,900
Tonto.....	Arizona.....	1,120	6,700	6,150
Tumacacori.....	do.....	10	7,100	11,400
Tuzigoot.....	do.....	43	8,000	4,700
Verendrye.....	North Dakota.....	253	43,250	5,850
Walnut Canyon.....	Arizona.....	1,879	12,000	12,300
Wheeler.....	Colorado.....	300	4,255	1,500
White Sands.....	New Mexico.....	144,946	69,800	74,650
Whitman.....	Washington.....	46	4,100	12,450
Wupatki.....	Arizona.....	35,813	3,250	3,300
Yucca House.....	Colorado.....	10	50	101
Zion.....	Utah.....	49,150	4,250	150
National military parks:				
Chickamauga and Chattanooga.....	Tennessee.....	8,551	302,850	364,850
Fort Donelson.....	do.....	103	51,150	40,000
Fredericksburg and Spotsylvania County Battlefields Memorial.....	Virginia.....	2,424	110,400	112,250
Gettysburg.....	Pennsylvania.....	2,425	490,650	787,500
Guilford Courthouse.....	North Carolina.....	149	11,300	38,600
Kennesaw Mountain National Bat- tlefield Park project.....	Georgia.....	2,813	-----	-----
Kings Mountain.....	South Carolina.....	4,012	17,000	23,100
Moores Creek.....	North Carolina.....	30	2,950	4,500
Petersburg.....	Virginia.....	2,047	207,950	199,400
Richmond National Battlefield Park project.....	do.....	-----	44,100	-----
Shiloh.....	Tennessee.....	3,717	196,200	261,450
Stones River.....	do.....	324	4,400	4,300
Vicksburg.....	Mississippi.....	1,338	158,450	234,300

See footnotes at end of table.

National park system, acreage, and visitation—Continued

Areas (classification)	Location (State)	Approximate acreage	Approximate visitors, fiscal year July 1, 1941- June 30, 1942	Approximate visitors, 5-year aver- age, 1938-42
onal historical parks:				
Abraham Lincoln.....	Kentucky.....	111	92,600	115,800
Chalmette.....	Louisiana.....	30	17,100	24,000
Colonial.....	Virginia.....	6,793	649,400	563,800
Morristown.....	New Jersey.....	1,051	139,000	169,680
Saratoga project.....	New York.....	1,428	59,100	126,350
onal cemeteries:				
Antietam.....	Maryland.....	11	(⁵)	(⁵)
Battleground.....	District of Colum- bia.....	1	1,500	3,500
Chattanooga.....	Tennessee.....	136	(⁵)	(⁵)
Custer Battlefield.....	Montana.....	765	29,600	23,000
Fort Donelson.....	Tennessee.....	15	(⁵)	(⁵)
Fredericksburg.....	Virginia.....	12	(⁵)	(⁵)
Gettysburg.....	Pennsylvania.....	16	(⁵)	(⁵)
Poplar Grove.....	Virginia.....	9	(⁵)	(⁵)
Shiloh.....	Tennessee.....	10	(⁵)	(⁵)
Stones River.....	do.....	20	(⁵)	(⁵)
Vicksburg.....	Mississippi.....	120	(⁵)	(⁵)
Yorktown.....	Virginia.....	3	(⁵)	(⁵)
ional parkways:				
Blue Ridge.....	Virginia-North Carolina.....	34,296	300,000	234,700
George Washington Memorial.....	District of Colum- bia, Virginia, Maryland.....	2,367	(²)	(²)
Natchez Trace.....	Mississippi.....	12,834	(²)	(²)
ional battlefield sites:				
Antietam.....	Maryland.....	54	7,900	26,800
Brices Cross Roads.....	Mississippi.....	1	1,500	3,000
Cowpens.....	South Carolina.....	1	6,000	5,000
Fort Necessity.....	Pennsylvania.....	2	43,000	75,000
Kennesaw Mountain.....	Georgia.....	60	19,900	10,000
Tupelo.....	Mississippi.....	1	3,600	6,000
White Plains.....	New York.....		(²)	(²)
ional memorials:				
Camp Blount Tablets.....	Tennessee.....			
Kill Devil Hill.....	North Carolina.....	314	72,950	72,575
Lee Mansion.....	Virginia.....	50	259,500	393,750
Mount Rushmore.....	South Dakota.....	1,710	31,500	86,300
New Echota Marker.....	Georgia.....	1	3,000	5,450
Older Dam National Recreational Area.....	Arizona-Nevada.....	1,737,893	647,200	863,600
ional historic sites:				
Atlanta Campaign Markers.....	Georgia.....	21		
Federal Hall Memorial ⁶	New York.....	49	(²)	(²)
Fort Raleigh ⁶	North Carolina.....	16	79,350	31,075
Gettysburg Cyclorama National Historic Object ⁶	Pennsylvania.....			
Gloria Dei (Old Swedes' Church) ⁷	do.....		(²)	(²)
Hopewell Village ⁶	do.....	6,198	66,900	130,950
Jamestown Island ⁶	Virginia.....			
Jefferson National Expansion Mem- orial ⁶	Missouri.....	77	(²)	(²)
Manassas National Battlefield Park ⁶	Virginia.....	1,605	5,050	3,625
McLoughlin House ⁷	Oregon.....		(²)	(²)
Old Philadelphia Custom House ⁶	Pennsylvania.....	1	(²)	(²)
Salem Maritime ⁶	Massachusetts.....	9	7,450	3,850
San Jose Mission ⁷	Texas.....			
Vanderbilt Mansion.....	New York.....	212	16,150	6,750
ional Capital Parks.....	District of Colum- bia.....	1025,570		
House Where Lincoln Died.....	do.....		31,150	43,000
Lincoln Memorial.....	do.....		1,071,150	1,340,350
Lincoln Museum.....	do.....		51,550	67,700
Washington Monument.....	do.....		813,550	894,500
Grand totals.....		21,686,029	16,034,285	16,996,910

Less than 5 years.

¹ Travel record not maintained.² Closed to visitors for duration of war.³ Estimated. Complete travel figures are
not available.⁴ Included in figures for battlefield site,
military park, or historical park.⁵ Federally owned; operated by cooperating private agency.⁶ Privately owned and operated.⁷ Federally owned and operated.⁸ Federally and privately owned and operated.¹⁰ Includes Chopawamsic Area in Virginia.

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National park system, acreage, and visitation—Continued

Areas (classification)	Location (State)	Approximate acreage	Approximate visitors, fiscal year July 1, 1941-June 30, 1942	Approximate 5-year average, 1934-4
National monuments—Continued.				
Fort Laramie	Wyoming	214	5,450	2,500
Fort Matanzas	Florida	18	9,600	17,500
Fort McHenry	Maryland	48	589,350	461,500
Fort Pulaski	Georgia	5,427	28,800	41,500
Fossil Cycad	South Dakota	320	(?)	(?)
George Washington Birthplace	Virginia	394	35,700	49,000
Gila Cliff Dwellings	New Mexico	160	300	18
Glacier Bay	Alaska	2,299,520	(?)	(?)
Gran Quivira	New Mexico	611	2,550	2,700
Grand Canyon	Arizona	201,291	160	100
Great Sand Dunes	Colorado	46,034	11,100	10,000
Holy Cross	do	1,392	435	1,000
Homestead	Nebraska	161	1,000	1,000
Hovenweep	Utah-Colorado	286	50	200
Jewel Cave	South Dakota	1,275	2,400	3,500
Joshua Tree	California	837,480	28,500	11,200
Katmai	Alaska	2,697,590	(?)	(?)
Lava Beds	California	45,967	27,500	33,000
Lehman Caves	Nevada	640	3,600	4,200
Meriwether Lewis	Tennessee	300	19,050	16,400
Montezuma Castle	Arizona	521	8,450	9,000
Mound City Group	Ohio	57	(?)	(?)
Muir Woods	California	425	117,600	128,000
Natural Bridges	Utah	2,740	450	700
Navajo	Arizona	360	400	900
Ocmulgee	Georgia	683	47,600	44,000
Old Kasaan	Alaska	38	(?)	(?)
Oregon Caves	Oregon	480	25,350	48,000
Organ Pipe Cactus	Arizona	330,687	24,450	11,500
Perry's Victory and International Peace Memorial	Ohio	14	20,975	28,400
Petrified Forest	Arizona	93,199	189,750	208,500
Pinnacles	California	14,498	7,500	21,000
Pipe Spring	Arizona	40	800	1,800
Pipestone	Minnesota	115	2,250	11,000
Rainbow Bridge	Utah	160	185	200
Saguaro	Arizona	63,284	11,250	16,500
Santa Rosa Island	Florida	9,500	175,200	118,100
Scotts Bluff	Nebraska	3,476	65,250	86,500
Shoshone Cavern	Wyoming	212	(?)	(?)
Sitka	Alaska	57	8,600	16,500
Statue of Liberty	New York	10	389,700	381,700
Sunset Crater	Arizona	3,040	11,050	10,100
Timpanogos Cave	Utah	250	6,850	10,900
Tonto	Arizona	1,120	6,700	6,100
Tumacacori	do	10	7,100	11,400
Tuzigoot	do	43	8,000	4,700
Verendrye	North Dakota	253	43,250	6,800
Walnut Canyon	Arizona	1,879	12,000	12,800
Wheeler	Colorado	300	425	1,500
White Sands	New Mexico	144,946	69,800	74,600
Whitman	Washington	46	4,100	12,400
Wupatki	Arizona	35,813	3,250	3,300
Yucca House	Colorado	10	50	100
Zion	Utah	49,150	4250	100
National military parks:				
Chickamauga and Chattanooga	Tennessee	8,551	302,850	364,500
Fort Donelson	do	103	51,150	40,000
Fredericksburg and Spotsylvania County Battlefields Memorial	Virginia	2,424	110,400	112,500
Gettysburg	Pennsylvania	2,425	490,650	787,500
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Petersburg	Virginia	2,047	207,950	199,400
Richmond National Battlefield Park project	do		44,100	
Shiloh	Tennessee	3,717	196,200	261,450
Stones River	do	324	4,400	4,500
Vicksburg	Mississippi	1,338	158,450	234,500

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Fredericksburg	Virginia	12	(¹)	(¹)
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Poplar Grove	Virginia	9	(¹)	(¹)
Shiloh	Tennessee	10	(¹)	(¹)
Stones River	do	20	(¹)	(¹)
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Blue Ridge	Virginia-North Carolina	34,296	300,000	234,700
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Fort Mifflin	Pennsylvania	2	43,000	75,000
Kennesaw Mountain	Georgia	60	19,900	10,000
Tupelo	Mississippi	1	3,600	6,000
White Plains	New York		(²)	(²)
National memorials:				
Camp Blount Tablets	Tennessee			
Kill Devil Hill	North Carolina	314	72,950	72,575
Lee Mansion	Virginia	50	259,500	393,750
Mount Rushmore	South Dakota	1,710	31,500	186,300
New Echota Marker	Georgia	1	3,000	5,450
Boulder Dam National Recreational Area	Arizona-Nevada	1,737,893	647,200	663,600
National historic sites:				
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Federal Hall Memorial	New York	49	(²)	(²)
Fort Raleigh	North Carolina	16	79,350	31,075
Gettysburg Cyclorama National Historic Object	Pennsylvania			
Gloria Dei (Old Swedes' Church)	do		(²)	(²)
Hopewell Village	do	6,198	66,900	130,950
Jamestown Island	Virginia			
Jefferson National Expansion Memorial	Missouri	77	(²)	(²)
Manassas National Battlefield Park	Virginia	1,605	5,050	3,625
McLoughlin House	Oregon		(²)	(²)
Old Philadelphia Custom House	Pennsylvania	1	(²)	(²)
Salem Maritime	Massachusetts	9	7,450	13,850
San Jose Mission	Texas			
Vanderbilt Mansion	New York	212	16,150	6,750
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Lincoln Memorial	do		1,071,150	1,340,350
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Grand totals		21,686,029	16,034,285	16,996,910

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Recreational demonstration areas ¹

Areas (classification)	Location (State)	Approximate acreage	Visitors (1942 fiscal year)
Alex. H. Stephens.....	Georgia.....	938	12,533
Beach Pond.....	Rhode Island.....	2,472	34,177
Bear Brook.....	New Hampshire.....	6,155	* 28,699
Blue Knob.....	Pennsylvania.....	5,136	12,214
Caunden Hills.....	Maine.....	4,962	24,290
Catoctin.....	Maryland.....	9,746	21,451
Cheraw.....	South Carolina.....	6,832	(²)
Chopawamsic.....	Virginia.....	14,080	(³)
Crabtree Creek.....	North Carolina.....	4,983	79,286
Cuiervo River.....	Missouri.....	5,802	11,836
Custer.....	South Dakota.....	20,187	.....
Fall Creek Falls.....	Tennessee.....	15,776	8,457
Hard Labor Creek.....	Georgia.....	5,802	34,666
Hickory Run.....	Pennsylvania.....	12,908	14,596
Kings Mountain.....	South Carolina.....	6,175	(⁴)
Lake Guernsey.....	Wyoming.....	1,753	.....
Lake Murray.....	Oklahoma.....	2,228	10,873
Lake of the Ozarks.....	Missouri.....	16,037	* 33,474
Laurel Hill.....	Pennsylvania.....	4,025	* 22,250
Mendocino.....	California.....	8,419	3,061
Montgomery Bell.....	Tennessee.....	3,744	15,762
Montserrat.....	Missouri.....	3,439	23,565
Oak Mountain.....	Alabama.....	7,805	* 4,840
Otter Creek.....	Kentucky.....	2,435	22,330
Pere Marquette.....	Illinois.....	2,522	27,840
Pine Mountain.....	Georgia.....	3,018	4,530
Raccoon Creek.....	Pennsylvania.....	5,034	14,445
Roosevelt.....	North Dakota.....	63,365	17,295
St. Croix.....	Minnesota.....	18,499	13,870
Shelby Forest.....	Tennessee.....	12,305	87,451
Silver Creek.....	Oregon.....	4,088	2,961
Swift Creek.....	Virginia.....	7,610	132,157
Versailles.....	Indiana.....	5,371	10,278
Waterloo.....	Michigan.....	12,018	35,881
Waysides.....	South Carolina.....	239	.....
Waysides.....	Virginia.....	206	.....
Winamac.....	Indiana.....	6,233	39,713
Yankee Springs.....	Michigan.....	4,197	196,091

¹ Act of June 6, 1942, authorizes Secretary of the Interior to convey or lease to States recreational demonstration projects, or any parts of such projects, transferred to him by Executive Order No. 7498, dated Nov. 14, 1936, the States to administer, operate, and maintain such areas for public park, recreational, and conservation purposes.

* Attendance for June 1942, estimated.

² Leased to State of South Carolina.

³ Transferred to National Capital Parks, August 1940.

⁴ Figures are for July to December 1940; January to June 1942.

* Figures for December 1941 to June 1942, estimated.

Fish and Wildlife Service

IRA N. GABRIELSON, Director

Custody of Wildlife and Fishery Resources in Wartime

THE second year of the Fish and Wildlife Service¹ was one of the most difficult in a history that through parent agencies extends well back into the nineteenth century. Still engaged at the year's opening in the task of organizing and coordinating the work of a new governmental unit, the Service had at the same time to face the adjustments required by the national defense program, adjustments that became all the more difficult in the middle of the year when war itself came to the Nation. Soon thereafter the Service was confronted with the task of preparing for the transfer of its headquarters to Chicago, Ill., and finally to the perplexities of these problems were added those of retrenchment in accordance with reduced appropriations for the next year.

Nevertheless, it is possible to report considerable success in wildlife and fishery conservation programs, and it is encouraging to realize that a series of progressive years had placed the resources in good condition to face the hazards that come to peacetime pursuits in time of war. Though thus encouraged, the Service and conservationists throughout the country were engaged in the grim task of conversion to war. Camps of the Civilian Conservation Corps, for example, which had provided labor for developing national wildlife refuges, were reduced from 36 to 12. Of the remaining camps, 4 were working on military areas, and arrangements were being completed for thus using the other 8, when, at the close of the year, action of Congress abolished the CCC. Other aspects of the Service's work, on the other hand, received increased emphasis.

Fishery Management

The fisheries of the Nation assumed immediately an outstanding importance as a source of vital food. The facilities of the Service

¹ This Service was formed on June 30, 1940, by consolidating the Bureau of Biological Survey and the Bureau of Fisheries in accordance with the President's Reorganization Plan No. III.

for making the fishery contributions most effective were mobilized and made available to the armed forces, the lend-lease agencies, and the industry. By the end of the year plans were well formulated for the program that began later with the appointment of the Secretary of the Interior as Fishery Coordinator and the Director of this Service as Deputy Coordinator.

The fishery contributions of food and essential byproducts, it was realized, are so great that without them the ability of the Nation to wage war would be lessened materially. Increasing demands for canned food led to an adjustment of regulations in Alaska whereby the fisheries may produce the maximum yield consistent with maintaining a future supply. Adoption of scientifically developed management measures by the States are allowing more fishes to grow to marketable size and to spawn, thus resulting in greater yields. Farming methods were advocated for restoring depleted oyster beds, and procedures of scientific oyster culture are improving the quality of the edible product. Although the "popular" fishes, including haddock, cod, shad, and salmon, are being harvested to capacity, the fishermen are being urged to concentrate on the landing of minor and less familiar species, with the result that many tons of food and byproducts are being derived from hitherto underutilized species. There are possibilities of further increases from this source, not only in the sea but even in the Great Lakes and the larger rivers. Additional sources of vitamin-potent fish oils are being sought to supplement present supplies, and possibilities for developing new products have been disclosed. The development of farm ponds in the Southern States is spreading rapidly under scientific guidance, and the adoption of improved methods of pondfish culture and pond fertilization and management is producing fishery resources of great aggregate magnitude in areas where fresh fish hitherto has been a luxury food. Not only are scientific investigation and development of methods for controlling industrial pollution saving tons of valuable fishes in inland and coastal waters, but control methods are resulting in the recovery of quantities of strategic material from the wastes.

Statistical compilations, too, were made as an essential labor of the Service. As vital in conservation of fisheries as other natural resources, these summaries stand as guides for Service activities and as aids in informing other Federal agencies and the public. Data collected for 1940 (the latest year for which complete figures are available) show, for example, that nearly 125,000 fishermen, employed that year in the catch of 4,059,524,000 pounds of fishery products, in waters of the United States and Alaska, profited to the extent of almost \$100,000,000—a 2-percent gain in value over the preceding year despite a 9-percent recession in volume. A total of about \$238,000,000 was estimated as the value of this harvest to domestic

fish handlers and processors (in whose plants worked an additional 90,000 men) as prepared for market in 1940.

collecting, compiling, analyzing, and issuing current data on the production, distribution, and marketing of all fishery products provided information of paramount importance in any Federal program incorporating food control, information of great value to the Office of War Relocation Administration, and also to the fishing industry. Investigations in canning and curing fishery products made available information on up-to-date methods in food preservation and indicated what processes are most suitable for canning or curing when increased supplies are demanded as a food-conservation measure. Other activities included examining samples of canned fish for quality; assisting military procurement officials to draw up purchasing specifications for fish and advising with them in their purchase of these products; working out methods of canning or curing species of fishes not now utilized; and advising on the practicability of proposed new canning ventures to increase the national food supply for emergency use.

At the request of a committee that included representatives of the United Nations, the Service's laboratories expanded their vitamin-A programs to include a survey of potential sources. In allied interest, liver and viscera samples were collected from many species of fishes and studied for A and other vitamin-oil content, concentrates, and most efficient methods of recovery. Other studies involved a factual survey on vitamin-D oils, the development of more rapid methods of drying fish for domestic use or shipment to our expeditionary forces and to the peoples of the United Nations, and finding a substitute for the agar-agar used in bacteriological media in many industrial and drug-manufacturing plants and by hospital and public-health services.

The purchasing of large quantities of canned fishery products for use by expeditionary forces and for export under the lend-lease program were seen as definite limiting factors on the quantity of canned fish available for domestic consumption. To counteract this effect, a detailed study was made relative to preservation of fishery products, a study that may enable the fishery resources of Alaska to supplement the domestic supply with minimum requirements for shipping space. Attention was also given to the rapidly growing importance of cold-storage locker plants, some 3,500 of which are available in this country and can be used in substituting frozen for canned fish. Fish producers, distributors, and locker-plant operators were acquainted with the manner in which channels of distribution can be established for utilizing this equipment. Close to half a million tons of fresh and frozen fishery products have been annually packaged in tin, including salmon, haddock, sardines, tuna, mackerel, crab meat, shrimps, clams, and oysters. With the tin supply as it is, the Service has engaged in experimental

and research work on substitute metals, on determining the fish that can be best marketed in forms other than canned, and standardization of the can sizes used for sea foods.

Specialists of the Service collaborated with the Navy Department and the Maritime Commission to maintain a proper balance between the number of vessels in each fishery taken for military use and retained for food production, and with the Agricultural Marketing Administration to enable that agency most efficiently to process fishery commodities for lend-lease use. One expert visited Japan on a detail relative to fishery matters for the Office of Lend-Lease Administration, pausing en route in England to make a rapid survey of distribution of lend-lease fishery products there.

In cooperation with the Coordinator of Inter-American Affairs, the Department of State, a survey of the fisheries of the Caribbean Sea was undertaken. Not only does this work promise of leading to the discovery of new fisheries and consequently new supplies of food, vitamin oils, and industrial materials to be developed locally and perhaps tapped by our own men, but it has also, it is hoped, advanced our good neighborly relations.

For the Office of Price Administration, War Production Administration, Public Health Service, War, Navy, and State Departments, War Relocation Administration, American Development Commission, and other Federal agencies, additional studies are being made, or the services rendered by specialists levied upon, to appraise species of fishes that can be taken in quantities for lend-lease or military use; to determine the methods of capture of various species in order that net-manufacturing may be more efficiently utilized for making camouflage nets; to prepare price data for determining ceilings on fishery products; to study the needs of the fishery industry for war-risk insurance; to advise the position fishery products should take in the stock of sea foods to be stored in Puerto Rico and Alaska in the event of emergency transportation; and to compile statistics on the production of sea foods in waters of various countries in the theatres of combat. Finally, at the request of the Board of Economic Warfare, may enable military to find local fish supplies abroad for our expeditionary forces and so allow more space for arms in ships. So, also, more men are left at home for domestic consumption.

The Service continued its protection of the fisheries of Alaska, yielding products having an average annual value of more than \$45,000,000, about nine-tenths of which is in canned salmon. Increased intensity of fishing is considered inevitable under war conditions, and greater vigilance has thus been deemed necessary on the part of the law-enforcement officers and biological investigators to prevent impairment of future fishery harvests through inadequate spawning.

The production of fish and eggs at the Federal fish hatcheries was maintained at approximately the same level as in the preceding year. The necessity for more economical operations compelled a revision of the program with the object of closing some of the hatcheries as well as deferring all new hatchery developments or expansion of existing units. Likewise distribution and planting practices were modified to meet new conditions. Attention was given to stocking farm ponds for the production of food, and to planting game fishes in more accessible waters so that urban populations may enjoy angling recreation with a minimum of travel.

Wartime Wildlife Management

Control of predators and rodents that are limiting factors on food production also took on increasing importance when war began. Livestock, poultry, and agricultural industries were protected by the elimination of 123,667 predatory animals, by controlling injurious insects on 20,966,606 acres of infested farm and range lands, and by destroying rats in town and country, thereby saving large quantities of the Nation's wool, fats, lanolin, food and feed resources for military and civilian needs and preventing the spread of animal-borne diseases transmissible to man and domestic livestock.

Furs became a concern of the armed forces facing the task of waging war in cold climates, and the Service rendered assistance illustrated by the appointment of its outstanding fur expert as a specialized consultant of the Cold Climate Clothing Section of the Quartermaster Corps. The Navy Department called upon the Service through its Division of Land Acquisition to appraise lands for war purposes in the State of Washington, and later requests for land appraisals and cadastral surveys in many parts of the United States so increased that at the close of the year the entire field staff of this division was engaged in appraising and surveying lands for the Navy Department. Its Washington staff was also engaged for the most part in preparing reports and maps submitted from the field on the areas appraised and surveyed.

In other ways also the Service applied its activities to the fighting needs of the Nation.

Projects not directly related to the war were drastically curtailed, but without discontinuing conservation programs that must not be abandoned. The extensive habitat-improvement and other development work accomplished during recent years on national wildlife refuge lands, for example, together with the excellent water conditions prevailing on most of the refuges last spring, demonstrated the value of these refuges in this period of national emergency in greatly increased wildlife production. All forms of wildlife occurred on the

refuges in greater numbers than ever before. Fur animals went to a point where they made a substantial contribution to the providing furs for outfitting troops for military duty in the climates. Wherever feasible without adverse effect on the grazing by domestic livestock, hay harvesting, agricultural production, and other economic uses of refuge lands were permitted thus making many thousand acres available for the production of food. Almost 1,000,000 acres of national wildlife-refuge lands were turned over to the War and Navy Departments for military purposes.

In wartime as well as in peace the Nation's natural resources must be safeguarded, and the Fish and Wildlife Service is one of the agencies upon which the responsibility rests to see that no adverse damage is suffered on the home front. Its efforts have therefore been exerted to make every possible contribution to the war but at the same time to provide security for the fish and wildlife resources during the struggle and for the peace to come—through every means and every effort that cannot be exerted directly in fighting.

Throughout the year the Service has been conscious of the importance of outdoor recreation to the citizens of a nation under the stress of war, and it has done everything possible to continue its efforts on behalf of those resources that are important to sportsmen and others who seek relaxation in the outdoors. Despite the devotion to war activities, increased numbers of persons sought recreation and relaxation by hunting waterfowl. This was indicated by the sale of nearly 1,400,000 migratory-bird hunting stamps, compared with 1,260,810 sold last year. Enforcement of the Federal laws and regulations protecting wildlife continued effective, and excellent cooperation in this work was given by an appreciative public and the game departments.

Importance of Fish and Wildlife Research

All the year's activities again emphasized the importance of the Service's fact-finding projects—fish and wildlife research, including field and laboratory investigations and experiments and the collection and compilation of statistical data. Wartime shortages of materials used in rodent control required intensification of studies of substitutes available from domestic sources. Plans for the best utilization of food resources were dependent on reliable data, and the development of new areas from which fishes can be taken required exploration. Such regulatory work as that of setting seasons for the hunting of migratory birds, as in the past, seemed feasible only with the knowledge based on year-round investigations—studies that during the past year indicated the desirability of relaxing restrictions and which, of course, demonstrated the success of the restoration program.

The research and conservation policies of the Department in management of the national migratory game-bird resources have, in fact, been fully justified by consistent increases under a sound utilization program during recent years. A survey inventory of big-game animals showed improvement in the status of this important food and recreational resource. Development of new methods for the control of destructive predatory animals, rodents, and birds assumed greatly increased importance in the war requirements for meat, cereals, fruits, and other food products because of the cutting off of supplies required for the preparation of standard materials heretofore used. Intensive work was concentrated on this requirement with promising results. Work on fur and fur fibers was directed vigorously to meet warm-clothing requirements of military and civilian agencies through new and improved manufacturing methods in utilizing pelts, fur, hairs, and waste materials. Increased fur-animal production was aided by presenting improved feeding and breeding practices and methods for the prevention and control of diseases. Thus despite demands for discontinuing many research projects during the war, it was the duty of the Service to emphasize the basic importance of continuing its scientific investigations.

Keeping the Public Informed

Though necessarily reduced, activities were continued to keep the public and particularly conservationists informed regarding the needs in safeguarding the fish and wildlife resources. With a curtailment of programs not directly related to the war, it was realized that prevention of raids on the resources under false pretexts become more important than before and require a vigilance on the part of conservationists that can be maintained only through adequate information programs. One of the most promising developments in the field of wildlife conservation in recent years has been the organization and growth of the Outdoor Writers Association of America and the increase of outdoor columns in the daily press, supplementing the contributions of outdoor periodicals and other agencies to conservation education. Thus, for the sake of maintaining conservation vigilance and also of meeting the needs of those who serve the information requirements of the public, it seemed essential to maintain the Service's basic responsibility for disseminating information though the output was drastically curtailed.

In one sense such publicity on the outdoors has seemed to be a distinct contribution to the Nation at war, for men and women whose time in the outdoors is limited, whose access to the tonic benefits of recreation in the open is cut off, may get some of their needed relaxation in reading, or in hearing radio broadcasts that bring the outdoors

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tions in the rate of reproduction, in the total fish populations or standing crops, and in the rate of fishing or withdrawal. The measurement of these variables involves also a relatively complete knowledge of the life histories, migrations, and ecological relations of the food fishes and of both the organisms on which they depend for food and those that prey upon them. Important, too, but in more limited spheres, especially in relation to oysters, clams, trouts, salmon, and certain pondfishes, are the perfecting of methods for artificial culture, farming, nutrition, and control of diseases, predators, and parasites—all vital activities in conserving existing stocks, restoring depleted populations, and creating new supplies. By the conservation of fishery resources on these principles, man is permitted to harvest and use the products of the waters to the fullest extent consistent with their perpetuation.

Commercial Fishery Management and Conservation

The annual fulfillment of the congressional mandate of February 9, 1871, to determine "whether any and what diminution in the number of the food fishes of the coasts and lakes of the United States has taken place" and "whether any and what protective, prohibitory, or precautionary measures should be adopted" demands more than simple statistical recapitulation. To meet the need, fishery biology, an exact science, has been developed by synthesizing the disciplines of biology, physics, chemistry, mathematics, economics, and logic. A brief résumé will illustrate the progress made in commercial fishery studies; recount new findings about the fisheries and the animals that support them; and tell of their use in developing conservation principles and management practices, of the recommendations adopted to insure the production of more fish of better quality, and of the restoration of depleted fisheries.

The possibilities for better coordination of fishery activities and for eventual attainment of the objective of uniform management are inherent in the ratification by the Congress on May 4, 1942, of the Atlantic Coast Marine Fisheries Compact, signed by nine States, under which the Service has been designated as the chief investigative and advisory agency.

The Service's only opportunity for direct application of findings in fishery biological research is in the management of the Alaskan fisheries, where the advantages of the flexible modern method as opposed to the traditional system of regulation by specific rigid legislation has been demonstrated.

The Fishery Mission to Mexico was continued and has made considerable progress in studies of the commercial fishery resources and

the development of sound management measures. Surveys and stocking of interior waters were also undertaken in cooperation with Mexican Government.

North Atlantic Area

Following the warning issued by the Service a year ago that the continued capture and sale of baby haddock would result in great financial loss and ruin the fishery, the industry voluntarily curtailed landings of baby haddock to only about 13 percent of the quantity landed during the previous year. Recommendations for increasing minimum size limit for haddock from 1½ to 2 pounds and enlarging mesh in trawls to release small fish, though not yet adopted, will materially increase the supply of large haddock.

Flounder catches showed marked improvement, owing to increased landings of yellowtails. This species dominated the catches, whereas a few years ago it was of only minor importance. The greater yield is out the Service's forecast that more fish could be produced by greater concentration on species not widely known or advertised. The black flounder had declined in yield and abundance, and current studies indicate the probable ineffectiveness of artificial propagation in maintaining the supply.

Since codfish were landed in greater quantities than ever before, the catches having risen from an insignificant figure in 1933 to 145,000,000 pounds. This unprecedented catch, an increase of 70 percent over 1933, has caused concern over the future of the fishery. Preliminary findings indicate the possible existence of more than one stock supporting the fishery and emphasize the need for control.

The reduced abundance of lobsters during recent years, about one-third of former high levels, indicates a need for better management. In Maine 96 percent of those marketed had never spawned. A higher minimum size limit, 3½ inches carapace measurement, instead of 3⅞ inches was recommended and already has been adopted in Maine, Massachusetts, and New York. Canada also followed the recommendation in parts of Nova Scotia and New Brunswick. The tagging experiments indicate that lobsters move only short distances, repopulation of depleted areas can be accomplished only by increased spawning and not by migration from other areas.

Atlantic salmon restoration was begun in Maine through the conclusion of a cooperative agreement between the Service and State conservation agencies, and the generous aid of the Canadian Government, which provided eggs for restocking.

Measurement of changes in mackerel abundance is an important problem, for the supply varies from year to year by as much as 20-450 percent, with corresponding variations in the total yield.

There seems to be no present danger of depleting the supply. Observations are being continued to trace trends of abundance and to stabilizing the fishery at a more productive and profitable level.

Middle Atlantic Area

The 1940-41 blue crab fishery production of Chesapeake Bay was about 50 percent less than in 1939, due chiefly to lack of an adequate spawning reserve, although unusually cold weather in January was presumed to have killed large numbers of crabs, especially females. Recommendations made for restoration included establishment of sanctuaries closed to crabbing from May 1 to September 1; enforcement of all size limits specified by Virginia and Maryland laws; discontinuing the holding of green crabs in seine floats; and adequate collection of catch statistics.

The Atlantic coast shad, except in the Hudson River, has been seriously overfished for years, the total food yield has been reduced, and shad fishermen are suffering economic distress. Based on experience in Chesapeake Bay and in North Carolina and South Carolina, the Service recommended a reduced rate of fishing as this would permit a recovery of shad populations comparable with that in the Hudson River where the fishing rate has permitted survival of sufficient spawning fish to bring the yield to the highest level in history. Maryland has adopted regulations that embody this recommendation of the Service.

South Atlantic and Gulf Areas

The spawning population of the common shrimp from Georgia to North Carolina, badly reduced by adverse weather in 1940, is being restored slowly, and normal fishing can be expected within a year or two. During this period of scarcity, the grooved shrimp occurred in unusual abundance, especially off North Carolina and Georgia. Research has been directed toward perfection of methods to determine the abundance of shrimp off the Texas coast, and toward correlation of abundance with climatological changes and assessing the effect of current fishing practices.

During recent years the crab fishery of Louisiana and the shrimp fishery of Texas have been so intensified that indications of depletion have become evident.

Pacific Area

Investigations of the Alaska salmon and herring fisheries produced data on the populations and runs of the various regions, which were used as a basis for regulations issued by the Secretary. Recommendations for management of the fisheries were prepared and

rd for the need of additional canned products and for insuring insurance of substantial future supplies.

udies were undertaken at the recently established laboratory at the Port Walter, Alaska, the results of which will place regulation on the great pink salmon fishery of southeastern Alaska on a firmer basis. By means of a two-way counting weir, the number of fry returning to the ocean from each year's spawning is determined. In this way the size of the next commercial run can be estimated with considerable accuracy and the fishing regulations adjusted to permit maximum safe catch.

The greatly increased demands for canned fishery products, as well as for meal and oil, have stressed the importance of the pilchard fishery. A serious feature is that the catch continued to be composed predominantly of small fish, even in waters north of California, where herring they had been much less numerous. Fishing intensity since 1913 increased fourfold over that from 1925 to 1933. Total mortality increased concurrently from 40 to 80 percent per annum, a near maximum rate of exploitation.

The shark fisheries, stimulated by wartime demands for vitamin B₁₂ and by its high concentration in certain shark-liver oils, especially those of the soupfin shark, developed so rapidly as to suggest that the catch may be too high in relation to the available supply and depletion may be imminent. In the interest of economy, it has been urged that carcasses be landed to provide for the utilization of additional materials that are lost when only the livers are removed at sea and carcasses discarded.

Great Lakes Area

The Lake Huron whitefish will soon be added to the list of species that no longer support fisheries, a fact emphasizing the need for immediate action to control adverse conditions if these fisheries are to be preserved. In 1931 the catch of these whitefish was 4,140,000 pounds, but it has declined continuously ever since; in 1939 it was 5,000 pounds; in 1940, 188,000 pounds; and in 1941, 114,000 pounds, only 2.8 percent of the 1931 catch. Destruction of the fishery is eminent, owing to the introduction of the deep trap net in 1928 and its multiplied use during later years. Prompt control of this highly destructive gear at the outset would have saved the fishery, but warnings of the Service were not heeded until the damage was done. The International Board of Inquiry for the Great Lakes Fisheries, established by Canada and the United States on February 29, 1940, has completed its work, and it may be forecast with certainty that the final report will recommend some form of unified control and scientific management of the fisheries to replace the present divided jurisdiction among nine regulatory bodies.

Shellfishery Investigations

In investigations directed toward the solution of practical problems concerned with the cultivation of oysters and other mollusk culture and management of oyster bottoms, improvement in the quality of the product, protection against enemies and pollution, and measures for restoring stocks, special surveys were conducted in Louisiana, Texas, and Washington to determine causes of low production. Private oyster farming was recommended as one method of producing additional wartime food. To enable oyster growers to learn new methods, demonstration oyster farms were set up with State cooperation in North Carolina and South Carolina. Farming of mollusks as a means of providing more food was undertaken experimentally; only a few months' work has shown its feasibility.

Oyster cultivation has been assisted by the development of a new method of spreading quicklime on oyster beds to destroy pest starfish and by the use of a strong solution of copper sulphate to destroy young oyster drills. In the control of the boring clam, which has been found more difficult, the best method yet devised is to destroy oystershells that harbor the pests and plant clean seeds.

Sponge Investigations

There was a recurrence of the sponge blight that caused widespread damage off Florida and the West Indies 2 years ago, but it was less intense and appeared in only a few localities. The causative organism was identified definitely as *Spongiophagus*, a water-borne fungus. Florida grounds are showing good recovery, and if no further epidemic occurs a return to normal sponge-fishing operations will be possible within 2 years.

Management of Angling Resources

The war has given added importance to fresh-water angling resources, not only because of their recreational aspects but also because they make a significant annual contribution to the food supply. Intensification of hitherto limited activities in local fisheries for cold-water fishes, and the creation of new fisheries for warm-water species in areas where fishing possibilities are few, are but two of the direct measures compensating the tremendous demands now made on the commercial fisheries at all the great coastal producing centers.

The fish-management investigations that have been carried on for several years are beginning to yield positive results, particularly in the southern Appalachians, where they demonstrated that trout production can be improved greatly by consistent stocking, even in streams

ly poor in food. They have also shown that the number of trout dying from natural spawning is approximately the same from year to year and that increases in the numbers available to anglers must be supplied by artificial stocking. Experiments on conditioning hatchery fish have proved that gradual acclimatization of trout to stream conditions prior to planting results in much greater survival.

The farm-pond program, a relatively new development, offers possibilities for increasing fish production and fully utilizing undeveloped water areas. The belief of many that a fishpond once stocked will continue to produce year after year, with no attention, is erroneous.

To afford optimum conditions for good fish growth, ponds must receive care similar to that of farm lands—fertilization, control of noxious weeds, and careful cropping. Experiments are gradually developing methods that the layman can apply in good pond management. Fertilization is not only instrumental in increasing and maintaining fish production in farm ponds but is also increasingly important in the production of warm-water fishes at hatcheries. Among various fertilizers being tested are soybean meal, cottonseed meal, mixtures of sheep manure and superphosphate, and inorganic compounds. Heavy fertilization of standing waters is proving to be the most effective method of controlling undesirable aquatic vegetation, in that it does not subject fish to the hazards inherent in copper sulphate, sodium arsenite, and other chemical weed killers.

Testing artificial diets for hatchery fish was continued in various attempts to devise feeding procedures that provide good growth at low cost—an important factor in raising large quantities of fishes to fingerling or even to legal size before planting in streams.

Fish Parasites and Diseases

Diseases and parasites are the greater deterrents to hatchery efficiency. New contributions to the pathology of fishes included the isolation of the causative organism of ulcer disease, a strain of *Bacteria* *luminicida*, another strain of which causes furunculosis. Inoculations of healthy brook trout with a pure culture of the new strain produced the typical lesions of ulcer disease. Progress was made in the study of fin rot disease, which, it was determined, is caused by infection by bacteria not yet isolated in pure culture. Four new species of external protozoan parasites, occurring on gill filaments, were discovered as infestations of crappies. A new suctorian parasite of smallmouth bass was described, and highly effective techniques for controlling these parasites *Costia* and *Trichodina* by means of formalin were developed, as was the fact that bacterial gill disease can be controlled by prolonged treatment with nontoxic concentrations of potassium permanganate.

Pollution Studies

Defense production, followed by actual war conditions, has intensified existing water-pollution problems and added new or little-known types of pollution. Wastes from paper, fiber, and pulp industries including rayon and viscose plants, increased in volume; the petroleum and its derivatives opened new oil fields with attendant pollution hazards; and increased and unrestricted mining activity added volumes of silt and rock wastes to formerly unpolluted areas. War also brought great changes in the chemical industry that resulted in new wastes, some harmless and others dangerous, but concerning which little is known. The mobilization of large concentrations of troops created in some areas difficult problems of sewage disposal and sanitation.

Given full cooperation of the War Department, field investigators of the Service studied pollution problems at 30 ordnance plants; visited 12 others where no pollution occurred. With standard test equipment installed on its laboratory trucks and in permanent pollution laboratories at Columbia, Mo., Fort Worth, Tex., and Spearfish, S. Dak., complete analyses of wastes were undertaken and biologically determined the effects of their components on fishes. As rapid results warranted, recommendations for pollution control were forwarded to the proper authorities, who are giving excellent cooperation in aquatic-resource preservation.

In addition to the special investigations at Army plants, regular programs for studying industrial pollution were maintained. A report on arsenical wastes was completed, and detailed researches are being made on mine wastes and return waters from irrigation projects. A manual for the study of water pollution is being prepared.

Fish Protection and Engineering Developments

Only in recent years has attention been paid to the preservation of fish in streams affected by the construction of dams for power generation and for irrigation, flood control, and other purposes. Consequently, some fisheries have been permanently lost. Detailed biological surveys as well as the solution of problems in engineering design, construction, and hatchery development are necessary for the protection of fishery resources in waters affected.

Stream surveys were conducted throughout the Columbia River Basin to appraise the effectiveness of fishery protective measures already in operation and to learn where additional protection facilities are needed. Programs of rehabilitation were planned for the vicinity of Shasta Dam, Calif., where the former spawning grounds in the upper Sacramento River have been made inaccessible.

The procedure followed is essentially similar to that in operation at Clark Island Dam on the Columbia River, where the great height of Grand Coulee Dam prevents the use of ladders or other devices that enable fishes to pass over lower dams. The upstream migrants are trapped below the dam and hauled to new streams suitable for spawning or to holding ponds where they remain until the sex products are ripe, can be stripped, and are incubated artificially in hatcheries. Surveys in the Willamette Valley were continued in cooperation with the War Department to determine the need for fish protection in connection with four high dams scheduled for future construction. Fish screens have been used with some success for many years to prevent the loss of fishes in irrigation diversions, but their designs have not yet been standardized. Screens constructed and operated by the Service serve both to conserve fishes and to test new designs and methods of operation. Accumulations of silt and debris on the screens are troublesome, and efforts are being made to overcome the difficulty by use of baffles. Fungous growth also clogs the screens, and customary automatic cleaning methods have been ineffective, but various devices tested experimentally have proved satisfactory.

Research on Birds and Mammals

Waterfowl and Other Migratory Birds

To supply current information as a basis for sound regulation, instigational activities were concentrated on the migratory game birds, a resource of great recreational and esthetic value as well as of economic worth. The food value alone of the estimated annual bag of 15,000,000 ducks and geese is not less than \$5,250,000 and when used as food the game releases its equivalent weight in domestic poultry and other meats.

The Waterfowl Situation

The Service's minimum objective for a continental waterfowl population has been achieved, the inventory of January indicating that the stock of ducks and geese has grown to about 100,000,000 birds, more than $3\frac{1}{2}$ times the estimate for 1935.

Canada.—Sampling of conditions on important Canadian breeding grounds was continued in Nova Scotia, New Brunswick, Prince Edward Island, Quebec, Manitoba, Saskatchewan, and Alberta. A report on British Columbia prepared by the chief migratory bird officer of that Province was received through the cooperation of the National Parks Bureau at Ottawa. A trip was made to Newfoundland, followed by a survey in the Maritime Provinces during the hunting

season. In eastern Canada there was a gratifying increase in numbers in most species of nesting ducks and geese. Only those of the important black duck appeared to have decreased slightly. During the fall migration, however, this species appeared in normal numbers. In the Prairie Provinces there was little change in the general water situation. Many sloughs and pot holes visited in 1940 were dry, whereas other areas that formerly grew wheat were supporting broods of ducks. Insufficient water to last through the season frequently resulted in waterfowl losses. A few moderately severe outbreaks of botulism occurred, and comparative analysis indicated that the number of birds produced probably varied little from that of 1940. Water levels were below normal in the Athabaska Delta, and although food was abundant most lakes lacked good rearing cover. As a result ducks were less common than the year before, and it seemed probable that many had continued northward to the McKenzie Basin. The great interior valleys of British Columbia supported a somewhat larger population of breeding waterfowl than in 1940, which was particularly gratifying in the case of the diving species.

Alaska.—The biologist of the Mississippi Flyway established summer headquarters at Chevak, in the lower Yukon Valley and from that point made an extensive survey of the vast breeding grounds of the region, which indicated a satisfactory increase in both ducks and geese.

Mexico.—The biologist of the Pacific Flyway continued studies in the Valley of Mexico and in western areas. The number of ducks reaching these winter quarters was far below normal, attractive climatic and water conditions keeping them in the United States. Geese and cranes were present in numbers that compared favorably with those of other recent seasons.

United States.—Studies in the United States were concentrated chiefly about units of the national wildlife refuge system. Abundance of water throughout the breeding grounds resulted in the highest waterfowl production in many years, a fact that was confirmed by reports from volunteer migration observers. In the North Central States and generally on the Pacific coast, sportsmen had good shooting, apparently close to normal. Elsewhere, however, due to continued mild weather, the kill was light.

Other Migratory Birds

Studies of the woodcock on its breeding grounds in Pennsylvania, Maine, and the Maritime Provinces indicate slow recovery from the losses suffered 2 years ago. Regulatory action affording complete protection to the Wilson's snipe was fully justified, as reports indicate a continued decrease in its numbers. The causes are not definitely

own, and this species should be made the subject of continental investigation. Studies of the status of the mourning dove were made during fall, winter, and spring, particularly in the Southeastern States. Recovery of this species, especially the eastern form, has not been satisfactory, indicating need for additional restrictions on shooting. A definite management plan for the white-winged dove will result from investigations being concluded during the calendar year 1942, including those of the biologist of the Central Flyway who worked with through eastern Mexico to Guatemala and El Salvador, and of a special party assigned to northwestern Mexico.

Distribution and Migration Records

For reasons of economy and to limit the use of aluminum needed for war purposes, bird banding was drastically curtailed. Though practically no new permits were issued, and work with colonial species was largely suspended, cooperators reported the banding of 30,842 birds, of which 46,758 were ducks and geese. Returns and recoveries totaling 25,846 brought the grand total to more than 2,000. Distribution and migration data received from 225 observers added 44,340 records to the files. In addition, 900 locality and 817 bibliographic references were compiled.

Wildlife Surveys and Management

Wildlife Relationships to Forest and Range

In the Lake States the goldfinch, junco, chipping sparrow, and Brewer's blackbird, and the white-footed mouse, chipmunk, and red squirrel, seriously reduce both the natural and artificial regeneration of jack pine. The practical remedy after fires or logging operations is to plant seed at ebbs in these animal populations and to treat the seed with certain recently developed repellents. Experiments show that bird damage to longleaf pine reproduction in Mississippi and Florida, is partially offset by direct seeding following planned burning. Studies on the San Joaquin Experimental Range, Calif., reveal that the ground squirrel, kangaroo rat, and cottontail rabbit compete directly with livestock for forage. Damage by the pocket gopher to vegetation in foothill areas is adequately compensated through benefits resulting from the presence of this rodent. Pneumonia and malnutrition contribute to constant fluctuations in the numbers of all species of rodents and rabbits and of some species of birds. Investigations at the Squaw Butte Experimental Range, Oreg., show that rodents prevent the reseeding of crested wheatgrass in midsummer. The remedy appears to be artificial seeding in periods of rodent scar-

city. A plague of meadow mice destroyed 50 percent of grass, 25 percent of bitterbrush and other browse plants in some Oregon areas. Experiments were begun in Montana and Idaho to determine the effects of fire on rodent populations and the measures necessary to protect forest plantations from rodents. Pocket gophers are of importance on Rocky Mountain and Intermountain ranges in relation to livestock grazing. Overutilization of range by livestock and deer constitutes a serious problem in Nevada and California forests, and recommendations were made for liberal reductions in livestock herds in critical areas. Damage to ponderosa pine in Arizona by Abert squirrels was controlled by live trapping for several years in other areas and by supervised hunting.

In Arizona and New Mexico jack rabbits were most abundant in overgrazed livestock areas. Smaller numbers were noted on some ranges, and an increase on good grass lands. Active cooperation in the work on forests and ranges included the Forest Service, Game Service, Soil Conservation Service, and State conservation departments.

Cooperative Wildlife-Management Research

Active cooperation with the land-grant colleges, State conservation departments, and the American Wildlife Institute was continued in wildlife management research in 10 States representative of all regions (table 1). As in preceding years the major objectives were: (1) Research on important problems in wildlife management, (2) training young men for management and investigative work, and (3) cooperation with all agencies in translating research findings into active programs and practices. A brief tabulation of activities follows:

TABLE 1.—Activities in cooperative wildlife-management research, 1942

Units	Projects		Graduate students trained	Active cooperators	Units	Projects		Graduate students trained
	Carried	Completed				Carried	Completed	
Alabama	6	0	7	15	Pennsylvania	11	2	1
Iowa	10	2	8	17	Texas	7	0	1
Maine	8	3	6	18	Utah	9	4	1
Missouri	17	7	13	22	Virginia	11	5	1
Ohio	12	5	8	15				
Oregon	7	4	8	16	Total	98	32	70

† Wildlife under investigation: Wild turkey, quail (bobwhite and mountain), ring-necked pheasant, grouse (ruffed and sage), mourning dove, woodcock, Hungarian partridge, deer (white-tailed and blacktail), antelope, snowshoe hare, cottontail rabbit, squirrel (gray and fox), muskrat, beaver, opossum, weasel, red fox, predators, and waterfowl.

Biological Investigations on Wildlife Refuges

In the Wichita Mountains Wildlife Refuge, Okla., rainfall above normal produced a heavy growth of annual forage plants and an increase in long grasses, possibly crowding out some of the valuable short grasses. The small herd of introduced pronghorn antelope is slowly increasing. On the Sheldon National Antelope Refuge, Nev., and the Mt. St. Helens National Antelope Refuge, Oreg., competition between wild game and domestic stock and the range requirements of the antelope were studied. A cover-type map of the Sheldon Refuge was completed in cooperation with the Grazing Service and a management plan projected.

State Biological Surveys and Faunal Studies

Investigations were continued on a biological survey of the State of Washington, a report on the biological survey of the Aleutian Islands is nearing completion, a manuscript was completed for publication as a North American Fauna on the habits, classification, and distribution of North American wolves, work progressed on revisions of the classification of American pumas and the white-tailed deer, and a study was completed of the marten of the northern Rocky Mountains, with plans for its management. From surveys an estimate was made of 64,391 big-game animals in the United States at the close of 1940. The mammal collection was increased by 800 specimens, 496 specimens were identified for other institutions, and 706 were loaned. To the bird collection were added 935 specimens, 819 specimens were identified for other institutions, and 716 were loaned. A leaflet describing the Biological Surveys mammal collection was issued. Service biologists described 12 new mammals belonging to the genera *Canis*, *Urocyon*, *Lutra*, *Nasua*, *Onychomys*, *Peromyscus*, *Pitymys*, *Tamias*, *Thomomys*, and one new bird of the genus *Colinus*. The Biological Surveys laboratories were used by more than 150 cooperative research workers.

Economic Investigations on Wildlife

Wildlife relationships.—Studies were continued in cooperation with the Bureau of Entomology and Plant Quarantine, Department of Agriculture, of the relationship of birds to rice production, particularly to the control of insect pests of rice. Investigations were made of waterfowl depredations on crops in Colorado, Utah, Idaho, and Washington and of the effectiveness of control methods. In surveys of damage by starlings to horticultural crops, methods for prevention

were tested. Economic relationship studies involved bald eagles, band-tailed pigeons, gallinules, owls, foxes, raccoons, and cats. Cooperation in wildlife food studies was extended to Federal and State agencies, and eight State conservation agencies utilized the Service's laboratory facilities for work on wildlife problems. Completion of field research on the economic status of the Canadian porcupine included the development of measures that eliminate losses due to local concentrations in timber and forest production and maple-sugar production areas and in orchard and crops. A color motion picture on the subject was filmed and will be available for public use.

Control Methods

Coyote control.—Research on coyote control methods included to determine the efficacy of a new device, the "coyote-getter," a discharging cartridge. Results obtained from 82,000 traps and 107,000 set days with the new device disclosed that the device is less destructive than steel traps to domestic sheep, big game, furbearers, and large birds of prey and that the trap is superior for use in cattle pastures and in sections containing bears and dogs, but more subject to interference by rodents. The coyote-getter was generally more effective in severe weather; the trap in mild weather. The new device is being used to a limited extent in coyote control in the Western States to supplement trapping operations.

New or substitute control poisons.—As the war has cut off imports of thallium, squill, and strychnine, programs of predator and rodent control must depend upon poisons that can be effectively used as substitutes. Tests thus far made indicate that zinc phosphide, though not so consistently satisfactory, may serve in place of strychnine and thallium in rodent control.

Propagation of red squill.—Toxic red squill, a most important poison formerly imported from Mediterranean countries can be grown in the United States, although the supply of bulbs and seed for this purpose is limited. Experimental propagation of the plant is being developed through cooperation with the Bureau of Plant Industry of the Department of Agriculture. Red squill requires 4 to 5 years, however, to mature. It is hoped that through careful selection of tests marked increase can be made in the toxicity of bulbs and seed. Numerous cooperators from Florida to southern California are engaged in this effort. The process for the fortification or strengthening of low-grade squill powder developed by the Service last year is now put to practical use in rat-control work. In addition to the Government-operated fortification unit at Denver, a plant was set up at Louisiana under technical direction of Service scientists.

Control of rabbits on southwestern ranges.—Ranches in the Southwest have been periodically confronted with ravages by jack rabbits and other rodents on the open range, particularly under the combined pressure of livestock and drought. Removal of livestock alone will not correct the situation—the rabbits also must be removed for a season. An investigator is working on a low-cost method for range control on areas of relatively low forage production.

Black rat control.—An experienced investigator was sent to Florida to develop control methods for black and Alexandrian rats in the southern coastal areas and at ports where the entrance of rats infested with plague or typhus-bearing parasites might occur.

Eagle studies.—Federal legislation giving protection to the bald eagle in all parts of continental United States except Alaska has focused attention on its economic relationships, but investigations of the status of this and the golden eagle have been largely stopped by war conditions. The bald eagle is relatively uncommon over much of the United States though still abundant in the coastal region of southern Alaska, despite being long subject to bounty payments there.

Upland Game Birds

Nutrition and physiology of upland game birds.—As a basis for management, comparative studies were made of the feeding of immature ring-necked pheasants and ruffed grouse. In studies of nutritional requirements of breeding bobwhite quail the effects of various kinds of feed on the health of these birds were extensively tested, certain ones showing important results in the lowered death rate of young birds. The symptoms of vitamin A deficiency in quail were determined.

Upland game management.—The results of stocking a pure strain of wild turkey on Bull Island, S. C., in 1940 were encouragingly successful, as there was a marked population increase after two breeding seasons. Cooperating with the Forest Service, Department of Agriculture, a management unit known as the Wambaw Wild Turkey management area was established on the Francis Marion National Forest, S. C.

Waterfowl Habitat Studies

Marsh management.—Surveys were completed of the 200,000 acres of wildlife refuge land in Louisiana, and recommendations made to state authorities for needed biological improvements for fur, fish, and other wildlife resources. Investigations of waterfowl habitats demonstrated the relation of shallow water areas and cyclic organisms to the occurrence of duck sickness and pointed to remedial management measures. Grazing was shown to be an aid to maintenance of desir-

able goose and shorebird habitat. Habitat and economic relations of the sandhill crane were investigated on breeding grounds in Oregon and on wintering areas in New Mexico and Texas.

Mosquito control in wildlife habitat.—Completion of a 4-year study on means of coordinating necessary mosquito control with wildlife conservation demonstrated that by developing appropriate water-control structures in coastal or tidal marshes so as to maintain fishes at all times, mosquito breeding usually is practically eliminated and that improving such marshes for waterfowl may afford local control of mosquito production. In cooperation with the Tennessee Valley Authority, an analysis was completed of the results of malaria-control practices at power and flood-control reservoirs.

Propagation of waterfowl food plants.—In studying optimum storage conditions for the germination of seeds of five valuable species of bulrush, in cooperation with the Bureau of Plant Industry, it was found that material stored wet gives uniformly better results than that kept dry. The effects of changing salinities and of silting on the production of marsh and aquatic plants were recorded for the tidal section of the Potomac River. Successful experimental plantings of waterfowl foods were made in storm-created ponds at the Delta National Wildlife Refuge, La.

Control of pest plants.—Changing undesirable to desirable plant associations and maintaining the latter is imperative in developing and managing areas for producing game and fur. Intensive investigations were made on refuges in Louisiana, Tennessee, New Mexico, Oregon, Utah, and Maryland. Experiments in plant growth control by alteration of water levels, by planting desirable competing species, by use of chemical agents and mechanical devices, and by grazing and burning, showed that each method is effective under appropriate conditions.

Fur Animal Conservation and Restoration

Wartime Use of Furs

To render maximum service toward insuring that our armed forces in cold climates shall be properly equipped with warm clothing, the fur resources program was reorganized, cooperative arrangements were entered into with the Quartermaster Corps and the War Production Board, and the Secretary of War appointed an official of the Service as fur consultant. The Service supplied samples of numerous furs for use in determining their frost-resistant qualities and testing their suitability for sleeping bags and certain types of clothing. At the request of war agencies, comparative tests of furs and fabrics were initiated in cooperation with the Bureaus of Home Economics

Animal Industry of the Department of Agriculture. The receipts for furs sold by the Service amounted to \$2,466,308. These comprised furs taken on national wildlife refuges, \$73,891.77; predatory animal pelts, \$22,389.47; experimental and miscellaneous skins, \$28.76; and fur seals and blue foxes, \$2,360,698.

Cooperative Research

Fur-fiber investigations.—Continuing the study of factors contributing to desirable quality in pelts of fur animals, a preliminary analysis was made of inherited fur fiber characteristics associated with woolli-ness in domestic rabbits. Studies of luster in Karakul sheep pelts were furthered by construction of new apparatus, and information on the characteristics of Persian lamb curls was assembled from available foreign literature, contributing to investigations conducted in cooperation with the Bureau of Animal Industry. Toward the close of the year the entire program was so revised as to handle new projects having direct bearing on the war. These include studies of suitability of furs and fur fibers for war use, and the utilization of waste fur and fur scraps.

Reproduction studies.—In studies on the reproductive cycles of fur animals, continued in cooperation with Swarthmore College, work on the silver fox was concentrated on the relation of onset of heat to estrus, maturation of the ovum, sperm transport and respiration, spermatogenesis, and on chromosomes. A survey of breeding practices in mink ranching was begun. Relationship between delayed implantation and long gestation period in the marten was established. Seal reproductive and embryological material was also studied.

Nutritional research.—Nutritional studies on fur animals conducted in cooperation with Cornell University have shown that silver foxes require vitamins A, B₁, D, nicotinic acid, and the antigrey hair factor. The minimum requirements of foxes and minks for vitamin A were determined. The effects of thiamin deficiency and Chastek paralysis in foxes were found to be identical. A series of digestion trials showed that both minks and foxes digest cooked starch to the extent of 90 percent or more but that they do not digest raw starch so well. An estimate was made of the maintenance-energy requirement of adult foxes and minks. Studies were continued on the digestibility of high protein feeds by foxes and on the relation of nutrition to urinary calculi and Chastek paralysis in minks.

Fur-Animal Experiment Stations

New York.—Wartime conditions have demonstrated the wisdom of developing substitutes for raw meat in feeding fur animals. Experiments at the station near Saratoga Springs showed that beef meal, fish

meal, and tripe can be used to replace half the raw meat in summer mink rations. Preliminary studies indicated that mating minks on two consecutive days after March 9 or 10 is as satisfactory as the usual practice of mating them several times at weekly intervals. Observations were made of the effect on the quality of fox pelts of shaded fur sheds as compared with open, raised wire pens. Data obtained during the fox breeding season indicated a definite correlation between vulvar size, cell structure, and ovulation. Experiments are in progress to determine the minimum calcium requirements of growing fox pups.

California.—In a 27-month test at the Rabbit Experiment Station at Fontana, in which 56 does and 2,758 young were self-fed during the lactation period, it was found that a ration containing a limited number of cereal grains is satisfactory when the rabbits are given free choice of one or more grains in conjunction with a plant protein supplement and legume hay. The normal body temperature for rabbits was determined to be 103.6° F. Encouragement was given to the use of domestic rabbit meat in the Food for Freedom campaign.

Maryland.—Muskrat investigations at the fur animal field station on the Blackwater National Wildlife Refuge included correlation of house count with pelt production per acre and field studies of trapping management methods, effects of sex and season on market classification of pelts, and feeding and breeding habits. The value of fur research on the refuge was enhanced by the establishment there of a Weather Bureau observation unit. Studies of the muskrat and nutria in pens were expanded. Musk glands of muskrats and beavers and testes of muskrats were collected for the Bureau of Animal Industry for analyses with a view to the isolation of new compounds to point the way to an interpretation of steroid hormone metabolism. Embryological material also was assembled to complete the representation for the year. Upon request, a study was made of the possibilities for raising muskrats in the Mobile Bay Delta, Ala.

Wildlife-Disease Investigations

Fur animals.—Through laboratory and field tests an increased margin of safety in distemper vaccine for use with farm-raised minks has been achieved by prolonged exposure of the virus to formalin. A valuable contribution to knowledge of the hosts of canine distemper was made by the detection of this disease in a zoological park in red, gray, and kit foxes, raccoon dogs, coyote-dog hybrids, and dingoes. A source of loss in domestic rabbit has been eliminated by the recognition and removal from forage of the woollypod milkweed (*Asclepias eriocarpa*).

Big game.—The practice of vaccinating the buffaloes on game refuges against brucellosis is being continued, and a considerable num-

of young immunized animals are now safe for introduction into localities.

Bird diseases.—Measures for the control of infectious rhinitis in al have been improved by the use of bacterins in combating the secondary invading organism. An important relationship of the bacterium *Pseudomonas aeruginosa* to *Clostridium botulinum* in outbreaks of western duck sickness has been discovered, and steps are being taken to apply this finding in more effective control measures.

National Park Wildlife

The study of the relations of predators to Dall sheep and caribou, begun in 1939 in Mount McKinley National Park, was completed. The presence of a rather stable wolf population the sheep numbers do not to have varied greatly in recent years, as it is generally the weaker animals that are captured. Wolf predation on lambs during their first winter seems the most important factor in stabilizing the sheep population. The caribou, which is the main wolf food, is a preferred species in respect to sheep and appears to be maintaining its numbers. No evidence was found of eagles preying on Dall sheep lambs.

A thorough range survey of Glacier National Park led to the coordination of the horse-grazing program with improved wildlife, vegetation, and soil-management practices. In Kings Canyon National Park, studies of grazing pressure by pack and saddle stock led to recommendations for the protection of scenic and recreational areas. Studies were made of livestock grazing in Arches and Zion National Monuments and Carlsbad Caverns National Park, and of winter range in Yellowstone National Park and of the possibilities for disease and probable consequent losses in big game. Survey of the critically overbrowsed condition of Zion Canyon in Zion National Park showed that tree and shrub reproduction is impossible with present deer numbers. As previous live-trapping of deer proved ineffective, more drastic reduction is imperative. Damage to forests by porcupines was investigated in Bryce Canyon National Park and Montezuma National Monument.

Inventories were made of wildlife populations in Kings Canyon, Sequoia, and Kings Mountain National Parks, Joshua Tree National Monument, and Cape Netarts State Park. A survey of Custer National Recreation Demonstration Area was made to determine the possibility of reintroducing big-game mammals. Inventories were made of the flora of Organ Pipe, Arches, and White Sands National Monuments and of the proposed Big Bend National Park. Cooperation was extended to military authorities at Fort Knox in reintroducing game and fur animals and at Fort Story in plans for mosquito control.

Investigation of aquatic resources were made in Kings Canyon National Park and Boulder Dam National Recreational Area. Waters of five recreational demonstration areas in Pennsylvania were inspected by Service and State biologists in a movement to formulate a fish-stocking policy for all areas in that State. A study of waters in Shenandoah National Park was made as a basis for determining streams to be stocked and for preparing fishing regulations.

Wildlife on Indian Lands

Wildlife research and conservation activities of this Service were this year extended to cover all Indian lands in the United States—about 55,000,000 acres. Under an agreement with the Indian Service, approved August 7, 1941, a project for investigations of wildlife on Indian lands was organized in the Fish and Wildlife Service to work on the conservation of wildlife resources of reservations and the increase of food and fur therefrom. Practical problems studied included food production from salmon, bison, deer, and other species; fur production from beavers, muskrats, and other fur animals; rodent and predator control; conservation and management education; drafting wildlife laws; and coordination of Indian and State conservation activities. The facts disclosed and the recommendations made had the following results: Six tribes enacted laws to maintain high yields of prime beaver pelts; management of the Crow buffalo herd, largest in the United States, was directed toward meat and hide production; salmon fishing was regulated on the Columbia River and on the Quillayute Reservation, Wash.; Indian claims to fish trap sites in Alaska were suspended to prevent hindrances to salmon production during the war; and wartime development of wildlife resources on the Colorado Reservation was begun by using Japanese evacuees.

National Wildlife Refuge Program

Land Acquisition

The program of land acquisition for national wildlife refuges was greatly curtailed by economic conditions brought on by the war. Early in the year it was decided not to institute arbitrary condemnation cases but to proceed only with those already filed.

The Migratory Bird Conservation Commission, at its only meeting of the year, on January 27, approved the Service's recommendation for the lease of 1 tract of 4,756 acres and the acquisition of 203 parcels totaling 23,511 acres in 22 refuge units, as follows: Bear River, Utah (an easement); Blackbeard, Ga. (headquarters site); Brigantine, N. J., 4.6 acres; Chassahowitzka, Fla., 4,837 acres; Chincoteague, Md.-Va., 10,000 acres; Horicon, Wis., 695 acres; Kentucky Woodlands, Ky., 248 acres; Lake Ilo, N. Dak., 144 acres; Lake Isom, Tenn., 11 acres;

Little Pend Oreille, Wash., 681 acres; Long Lake, N. Dak., 320 acres; Lower Klamath, Oreg., 1,275 acres; Necedah, Wis., 87 acres; Okefenokee, Ga., 980 acres; Parker River, Mass., 417 acres; Reelfoot, Tenn. (headquarters site); Santa Ana, Tex., 2,014 acres; Skagit, Wash., 81 acres; Tamarac, Minn., 212 acres; Union Slough, Iowa, 905 acres; White River, Ark., 532 acres; and Willapa, Wash., 65 acres.

On 29 refuges 121 acquisitions were closed, adding 58,394 to the acreage already under the jurisdiction of the Service. Appraisals were made of 331,000 acres for the program under the Federal Aid to Wildlife Restoration Act, and by Executive order there were reserved 3,114 acres of public lands in Arkansas and Washington under the jurisdiction of the Department of the Interior for use by the State game commissions in connection with State wildlife refuges established under that act.

Executive orders added 4 national wildlife refuges—the Kenai National Moose Range and the Kodiak, both in Alaska; the Safford, Ariz., and the Susquehanna, Md., involving 4,657,000 acres of public domain, 245 acres transferred from other agencies, and 2,895 acres leased—and one wildlife-management area of 81,049 acres, the Beltrami, Minn., for administration under Service custody by the Minnesota Department of Conservation, through the transfer of jurisdiction from the Department of Agriculture to the Department of the Interior; and enlarged the St. Marks Refuge, Fla., by 40 acres of public lands. Three easement refuges—the Creedman Coulee, Halfbreed, and Lamesteer, Mont.—involving 80 acres of public domain and 6,826 acres of land under gratuitous easement were added.

Surveys were made of 654 miles of boundary and interior lines; and 87 miles of boundary were staked for fence construction. Survey descriptions for title examination and preparation of deeds of conveyance for 411 tracts were completed on approximately 86,731 acres.

In March the Bureau of Yards and Docks of the Navy Department made the first of many requests for appraisals of lands for war purposes, and at the close of the year practically the entire land-acquisition personnel was engaged in evaluating and surveying lands and preparing reports and maps for that Department.

Development of Refuges

Despite great curtailment in the use of CCC, WPA, and NYA labor on wildlife refuges, development progressed considerably. The WPA furnished 5,747 man-months of employment, of which 1,173 were used on road improvements essential in the national emergency. The projects were operated principally in localities where relief labor was not required in connection with the war program.

In the past the CCC provided the labor necessary for extensive development operations on Federal refuges, but this year, in order to

furnish the greatest possible aid to the war program there was a transition of CCC activities from refuge development work to important war work and the number of camps assigned to the Service was reduced from 36 to 12. Of these, 4 were engaged in the development and improvement of military areas, and arrangements were completed for utilizing 8 camps on military areas or on projects necessary for the protection and conservation of national resources that are important to the war program. The work accomplished by the 4 military camps is typical of the contribution made to the war program by the CCC. It consisted of constructing and improving truck trails, fences, communications systems, bomb-storage shelters, pipe lines, rifle ranges, and recreational areas and in improving areas by mosquito control. Camps not detailed to military areas were assigned the important task of protecting natural resources, which involved the construction and maintenance of fire breaks and fire lines, extensive reduction of fire hazards, fire fighting, completion of water-control structures, dikes, dams, and other water-utilization projects, and biological development.

Administration and Management

The number of national wildlife refuges now administered by the Service is 272 (17,643,915 acres) (table 2), of which 254 (9,592,713 acres) are in the United States and 18 (8,051,202 acres) in Alaska, Hawaii, and Puerto Rico, 2 having been dropped from the list—Siskiwit, Mich., and Expedition Island, Alaska. Executive orders established 7 new refuges, and 8 refuges (1,272,407 acres) were placed under active administration with permanent personnel assigned. Exclusive of easement refuges, 101 units (11,960,268 acres) are now operated by a staff of 261 permanent and 36 part-time personnel, about the same as last year, although the acreage increased 12 percent, assistance from CCC and WPA was practically eliminated, and many employees were on military furlough with the armed forces. War restrictions on the purchase of tires, equipment, and repair parts reduced the operation of automotive and other equipment drastically, the permitted mileage for cars and trucks from a third to a half that of the previous year.

TABLE 2.—Classification and acreage of national wildlife refuges administered by the Fish and Wildlife Service

Classification	Number	Acres
For migratory waterfowl.....	184	2,962,025
For other migratory birds and general wildlife.....	25	3,973,754
For colonial nongame birds.....	46	104,149
For big game.....	16	10,601,364
Patuxent Research Refuge, Md.....	1	2,623
Total.....	272	17,643,915

Funds received from the Sixth Supplemental Defense Act of 1942 for the emergency protection of forests, forest industries, and important facilities were expended for that purpose on a number of refuges. Fires on refuges totaled 169 and involved 32,195 acres. Moneys made available under a special appropriation for soil and moisture conservation activities were allotted to 10 refuges.

For use for bombing and artillery ranges, troop maneuvers, military bases, emergency landing fields, and other war purposes, the Service turned over to the War and Navy Departments for the duration 972,987 acres of refuge lands—primarily submarginal areas in the South and Midwest and parts of large areas in the West used jointly for wildlife and livestock. No highly developed wildlife areas were released and little or no harm to wildlife has resulted from military activities.

Bird Refuges

The following bird refuges were established by Executive orders: Ash Creek (Safford), an upland game-bird area of 240 acres in Graham County, Ariz., transferred from the Soil Conservation Service (E. O. April 20, 1942); Susquehanna, an area of 2,900 acres in Cecil and Harford Counties, Md., primarily a resting and feeding refuge for ducks during migration (E. O. June 23, 1942); Creedman Coulee, an easement area of 2,684 acres in Hill County, Mont., as a waterfowl nesting and resting refuge (E. O. October 29, 1941); Halfbreed Lake, an easement area of 3,097 acres in Stillwater County, Mont., for waterfowl nesting and resting (E. O. May 19, 1942); and the Lamesteer, an easement area of 800 acres in Wibaux County, Mont., also for waterfowl nesting and resting (E. O. May 19, 1942).

Most of the waterfowl nesting refuges had more water and were in better condition than ever before, and several had an abundance of water for the first time since their establishment. The spring run-off gave the water-control structures the most severe test since their installation. Most of them proved adequate, although some suffered damage necessitating minor repairs.

Big-Game Refuges

Two new big-game refuges were established, both in Alaska: The Kenai National Moose Range (2,000,000 acres), for the protection of the giant Kenai moose and other wildlife (E. O. December 16, 1941); and the Kodiak National Wildlife Refuge (1,957,000 acres), for the protection of the brown bear and other wildlife (E. O. August 19, 1941).

The numbers of big-game animals on the fenced big-game areas are given in table 3.

TABLE 3.—Number of animals on fenced big-game areas maintained by the Fish and Wildlife Service

ANIMALS AS OF MAY 31, 1942

Refuge	Buffalo	Elk	Antelope	Big-horn sheep	Deer		Texas long-horn	Total
					White-tailed	Mule		
National Bison Range, Mont.....	497	143	-----	12	42	170	-----	864
Fort Niobrara National Wildlife Refuge, Nebr.....	123	31	-----	-----	8	5	37	204
Sullys Hill National Game Preserve, N. Dak.....	16	12	-----	-----	10	-----	-----	38
Wichita Mountains Wildlife Refuge, Okla.....	549	181	49	-----	626	-----	241	1,646
Total.....	1,185	367	49	12	686	175	278	2,752

YOUNG BORN IN CALENDAR YEAR 1941

National Bison Range, Mont.....	113	24	-----	3	1	21	-----	162
Fort Niobrara National Wildlife Refuge, Nebr.....	29	6	-----	-----	2	-----	7	44
Sullys Hill National Game Preserve, N. Dak.....	6	2	-----	-----	4	-----	-----	12
Wichita Mountains Wildlife Refuge, Okla.....	70	30	14	-----	50	-----	41	205
Total.....	218	62	14	3	57	21	48	423

Harvesting Refuge Crops

Extensive habitat improvement and other development work on refuges is resulting in greatly increased wildlife production. The restoration of drained marsh areas has served to increase substantially not only the numbers of waterfowl but also of fur animals, the pelts of which are of great value in outfitting troops in northern climates. In all, 153,000 muskrats and other fur animals were taken from refuge lands. Reconditioned water areas are producing enough fishes to permit the removal not only for sport but also for commercial purposes, thus supplementing the take of salt-water fishes that has been reduced because of naval and military coastal activities.

To keep the herds of big game at a level consistent with the available range, 136 buffaloes, 71 elk, 60 white-tailed deer, and 17 Texas longhorns were transferred from the 4 fenced big-game refuges to State conservation commissions for restocking or were sold or donated for exhibition, propagation, or food. The harvesting of wildlife from the refuges for restocking other public lands and through controlled public hunting increased greatly. Permits issued to State conservation departments authorized removal of 41,200 ring-necked pheasants, 1,215 deer, and 1,620 fur animals for restocking State areas, and more than 50,000 ducks and upland game birds were taken on lands open to public hunting. Grazing by domestic livestock, hay harvesting, agricultural crop production, timber cutting, and other economic uses of refuge lands were permitted wherever they would have no adverse effect upon wildlife. The total revenue from the lease of refuge lands and the sale of surplus refuge products was \$100,396.26.

Federal Aid in Wildlife Restoration

The benefits of 4 years' operation of the Federal aid in wildlife restoration program under the Pittman-Robertson Act are becoming increasingly apparent. Projects approved are being utilized by State game departments to gather information on scientific and administrative problems for which State funds had not been available; areas for wildlife restoration and perpetuation are being acquired; and developments are being made on private and public lands for game and fur production. The Federal Aid to Wildlife Restoration Act was amended to extend its benefits to Alaska, Hawaii, Puerto Rico, and the Virgin Islands. Restoration projects were inaugurated in all these areas except Hawaii, where action was postponed because of the war.

Acquisitions made by 18 States this year for wildlife breeding, feeding, and resting grounds totaled 150,081 acres, representing largely additions to existing State programs. Examples are the placing of many scattered refuges and game management units in Pennsylvania, Michigan, Iowa, Utah, and Washington; acquisition by Kansas of 6,800 acres in the Cheyenne Bottoms for developing a combination waterfowl refuge and public shooting ground; purchase by Wisconsin of land to restore the southern part of the famed Horicon Marsh; and purchase by Florida of 19,130 acres in the Charlotte County game management unit for deer, wild turkeys, and bobwhites.

A comparatively recent development in wildlife management has been the restoration by Federal aid of desirable species through soil-conservation practices. Game departments of Virginia, Florida, Alabama, Mississippi, Louisiana, Arkansas, Texas, Nebraska, Idaho, and Washington are supplying farmers in soil-conservation districts with seeds of soil-holding plants for use on field borders, gullies, and odd corners that cannot be successfully cultivated but will provide essential cover and food for game birds and mammals. Missouri conservation officials have cooperated with farmers in building ponds in areas deficient in surface water, to serve as refuges and breeding places for fur animals, waterfowl, and upland game birds and to provide water for domestic animals.

Many States are stocking depleted ranges with native wild-caught birds and mammals. Texas had unusual success with wild turkeys and reports increases up to 400 percent from transplantings. Virginia, West Virginia, Florida, and Texas transplanted white-tailed deer from areas where plentiful to those where scarce. New Mexico, Colorado, Wyoming, and Texas did the same with antelopes; and Alabama, Mississippi, Idaho, Oregon, Montana, and Wyoming, with beavers.

The 46 cooperating States, Alaska, the Virgin Islands, and Puerto Rico submitted and had approved 301 projects involving Federal funds of \$2,075,476.76. Of these projects, 111 (\$857,497.49) were for the purchase of lands, 99 (\$620,001.39) for developments of lands and

waters, 70 (\$490,901.64) for surveys and investigations into problems of wildlife management, and 21 (\$107,076.24) for direction and co-ordination of the wildlife restoration programs undertaken by the States.

TABLE 4.—Status of Federal aid to wildlife restoration funds for the fiscal year 1942

State, Territory, or possession	Federal apportionment fiscal year 1942	Unobligated balance June 30, 1941 ¹	1942 funds obligated June 30, 1941	Federal funds unobligated, July 1, 1941 ²	Obligations during fiscal year 1942	Balance June 30, 1942
Alabama.....	\$40,725.36		\$2,773.89	\$37,951.47	\$27,977.02	\$9,974.45
Arizona.....	53,149.13	\$9,616.07		62,765.20	55,338.75	7,426.45
Arkansas.....	31,388.09	14,099.28		45,487.37	22,219.81	23,267.56
California.....	111,800.92	82,032.68		193,833.60	150,572.91	43,260.69
Colorado.....	70,421.06		7,133.63	63,287.53	50,202.55	13,084.98
Connecticut.....	7,146.33		1,422.10	5,724.23	5,554.51	169.72
Delaware.....	3,420.30		3,028.64	391.66	³ 81.18	472.84
Florida.....	34,099.30	28,406.10		62,505.40	58,874.69	3,630.71
Georgia ⁴	37,902.31	32,644.80		70,547.11		70,547.11
Idaho.....	52,386.41		16,665.72	35,720.69	35,720.69	
Illinois.....	78,081.94	2,039.52		80,121.46	22,417.74	57,703.72
Indiana.....	75,403.24	8,745.41		84,148.65	65,535.90	18,612.75
Iowa.....	54,319.36	41,463.70		95,783.06	64,143.54	31,639.52
Kansas.....	48,668.07	34,497.62		83,165.69	52,287.41	30,878.28
Kentucky.....	33,031.15	29,363.32		62,394.47	19,276.18	43,118.29
Louisiana.....	36,502.37	7,213.96		43,716.35	38,243.82	5,472.53
Maine.....	30,370.71	1.33		30,372.04	24,810.26	5,561.78
Maryland.....	17,372.27	12,234.61		29,606.88	16,932.99	12,673.89
Massachusetts.....	16,501.20	779.70		17,280.90	7,467.78	9,813.12
Michigan.....	143,946.94	93,153.20		237,100.14	149,147.54	87,952.60
Minnesota.....	76,662.12	33,275.94		109,938.06	71,815.40	38,122.66
Mississippi.....	39,711.19		19,501.30	20,209.89	12,695.01	7,514.88
Missouri.....	61,904.65		22,436.95	39,467.70	533.95	38,933.75
Montana.....	77,247.05	14,070.33		91,317.38	39,942.03	51,375.35
Nebraska.....	54,155.19	12,324.47		66,479.66	48,157.53	18,322.13
Nevada ⁴	48,023.76	43,456.27		91,480.03		91,480.03
New Hampshire.....	12,974.66		2,279.24	10,695.42	6,307.79	4,387.63
New Jersey.....	24,993.46		1,516.77	23,476.69	9,026.46	14,450.23
New Mexico.....	55,671.21	47,251.85		102,923.06	58,847.90	44,075.16
New York.....	120,204.86		2,911.55	117,293.31	53,993.63	63,299.68
North Carolina.....	47,863.69	304.67		48,168.36	44,381.95	3,786.41
North Dakota.....	36,483.89	2,460.16		38,944.05	28,396.12	10,547.93
Ohio.....	104,909.05	87,387.36		192,296.41	133,114.23	59,182.18
Oklahoma.....	47,090.65		32,715.71	14,374.94	⁵ 1,778.81	15,553.75
Oregon.....	56,415.32	23,443.04		79,858.36	42,599.20	37,259.16
Pennsylvania.....	130,083.67		13,360.69	116,722.98	115,194.57	1,528.41
Rhode Island.....	1,958.42		1,342.29	616.13	⁵ 396.04	1,012.17
South Carolina.....	28,915.39		6,265.27	22,650.12	14,685.18	7,965.94
South Dakota.....	44,979.44		31,909.25	13,070.19	11,967.71	1,102.48
Tennessee.....	31,904.50		3,901.69	28,002.81	14,633.11	13,369.70
Texas.....	132,716.54		55,987.19	76,729.35	44,947.48	31,781.87
Utah.....	48,094.00		23,689.49	19,405.11	16,126.68	3,278.43
Vermont.....	11,593.55	7,758.52		19,352.07	7,562.34	11,789.73
Virginia.....	41,315.43		19,259.20	22,056.23	21,992.03	64.20
Washington.....	63,896.62		1,477.72	62,418.90	53,075.20	9,343.70
West Virginia.....	35,658.01		12,895.21	22,762.80	13,391.46	9,371.34
Wisconsin.....	72,939.26	18,295.97		91,235.23	89,663.92	1,571.31
Wyoming.....	44,996.36		7,436.16	37,560.20	23,933.40	13,626.80
Alaska.....	25,000.00			25,000.00	20,600.00	4,400.00
Puerto Rico.....	10,000.00			10,000.00	10,000.00	
Virgin Islands.....	10,000.00			10,000.00	10,000.00	
Total.....	2,575,000.00	686,319.90	294,910.56	2,966,409.34	⁵ 1,882,880.34	1,083,529.00

Does not include funds unexpended and unobligated during availability and transferred for carrying out the provisions of the Migratory Bird Conservation Act.

¹ Apportionment of Federal funds to Alaska, Puerto Rico, and the Virgin Islands was made on November 19, 1941.

² Credit adjustments (italic figures) during the fiscal year 1942.

³ Not eligible to participate.

⁴ Unexpended funds on completed projects have been deducted from this column and credited for future use.

Propagation and Distribution of Food and Game Fishes

Hatchery Production

The record of fish-hatchery production deviates from previous records in that it covers the calendar instead of the fiscal year, a change adopted because both the practical aspects of hatchery operations and the reproductive cycles of fishes impose a definite break, or seasonal interruption, in midwinter. Moreover, planting young fishes from the hatcheries corresponds in season to the annual increment from natural reproduction, and an accurate impression of yearly accomplishment cannot be gained if the tabulations are summarized in the middle of the propagating and distributing period. In presenting totals, therefore, there is an overlapping of 6 months and certain lots of fishes will appear in both reports. The duplication is more seeming than real, however, as the current report does not include figures for 2 consecutive reproductive periods for any species.

The gross production of fishes and eggs for the calendar year 1941, the output of 119 fish-cultural stations, some of which were under construction, was 5,862,960,200, a decrease of more than 15,000,000 from that of the fiscal year 1941. Among the groups showing increased production were six species of game trouts, both the largemouth and smallmouth black basses, and four species of Pacific salmon. The take of eggs of the buffalofish, an important freshwater commercial species, was doubled. The eggs were fertilized and planted on the spawning grounds, as also is done with eggs of groundfishes along the New England coast.

The policy of not releasing game fishes until they reach a larger size was reflected in an increase of about 10,000,000 fingerlings. There were decreases in several of the marine commercial species and in some of the lesser pan and game fishes.

The Carbon Hill, Ala., Hebron, Ohio, and Moorefield, W. Va., pond-fish stations operated on a productive basis for the first time. Two cooperative seasonal units were not used—the Senecaville, Ohio, station was not opened in the spring because of an inadequate water supply; and the Barneveld, N. Y., station was permanently closed.

Salvage operations along the Upper Mississippi River were insignificant in comparison with those of earlier years. Slightly more than half a million stranded fishes were seined from overflow areas.

Construction

All new hatchery developments and work on the partially completed unit at Farlington, Kans., were suspended at the outbreak of the war, but projects well advanced were continued, including hatch-

eries at Williams Creek, Ariz. Salem, Maine, Austin, Tex., and
ing, Ark. The substations for salmon propagation at Winthe
Entiat, Wash., built by the Bureau of Reclamation, are part
field establishment supervised by the Service and the latter was
in partial operation. The Bureau of Reclamation continued the
struction of the large Sacramento River salmon hatchery at Col
Calif.

Cooperation With Other Conservation Agencies

A decline in the number of applications for fishes submitted by
private individuals does not indicate a lessening of demand but
reflects the Service's policy of handling fish distribution through
conservation departments and other official bodies responsible for
management of lands and waters. The advantages of thus con
ing fish distribution have become increasingly evident, and though
much remains to be done in extending this policy, it has proved
type of informal Federal aid that results in greater returns from
expended.

Cooperative Predator and Rodent Control

The control of predatory animals and injurious rodents con
tributes to fulfilling the Service's obligations during the war
by increasing the food and feed supply through reducing depreda
of ground squirrels, jack rabbits, prairie dogs, and other rodents
growing and stored crops and range forage and reducing rat dan
city, town, and country; by increasing the food supply and ma
terials for clothing through protecting sheep, goats, and calves
slaughter by coyotes, wolves, and other large predators; and by
guarding public health through the destruction of rodent and pre
carriers of bubonic plague, typhus, rabies, and other infe
diseases.

In cooperative predator and rodent control, expenditures
made of \$873,597 from departmental funds; \$536,933 from coop
ing States; \$1,055,576 from cooperating counties, livestock and
cultural associations, and others; and approximately \$254,146
emergency funds.

Predator control resulted in the taking of 111,076 coyotes
wolves, 10,957 bobcats and lynxes, 204 mountain lions, and 639
tory bears, a total of 123,667. In rodent control operations, 728
acres of infested lands were treated under direct supervision
13,703,158 under general instructions. In cooperative rat con
assistance was given local communities in organizing rat control

, including permanent control measures. The Service's Supply and Laboratory at Pocatello, Idaho, prepared and distributed 224 pounds of rodent bait materials to cooperators throughout country and manufactured and distributed other equipment andplies used in predator and rodent control operations.

Destruction of Food and Property

Because of inability to apply control measures in all areas, heavy losses often occur in localities where destructive rodents and predators are numerous, as illustrated by the following instances.

In Arizona a goat raiser near Aquila, and his neighbor, lost 200 to goats annually to predators, and a sheep raiser reported that untain lions killed 26 sheep in one night in March. In the raine area of Florida, cotton rats destroyed \$10,000 worth of tomatoes and eggplants on 250 acres. At Belfield, N. Dak., a rancher lost many sheep to coyotes that he had to dispose of a flock of 200 sheep t he had owned for a year and a half; and in Slope County, N. Dak., er small flock owners report annual losses to coyotes of 15 percent of ir flocks. A poultryman in Pennsylvania lost 1,500 week-old chicks rats in one night. In a Rhode Island orchard 300 apple trees were killed by meadow mice with a loss of \$4,500. On a sugarbeet-seed ntation in Weber County, Utah, field mice destroyed 10 acres of ing plants having a value of \$3,000. On a farm near Georgetown, , wolves killed 192 pigs valued at \$768 and 46 calves worth \$368.

Conserving Food and Feed Supplies

f, as has been stated, food will win the war, every effort must be de to produce and to conserve it as a vital factor. To this end Service has cooperated with State agencies, local livestock, altry, and agricultural interests, individuals, and military establishments in preventing the destruction and damage of food and feed predators and rodents. The chairman of the United States partment of Agriculture War Board of Cass County, Tex., expressed nks to the Service for helping acquaint the farmers with the icultural outlook in the Food for Freedom program, stating that plan for controlling pocket gophers in and around peanut fields l greatly assist farmers in meeting their peanut quotas and that plan of directly coordinating work toward the war effort will terially assist them in meeting their goals.

Cooperative rodent control has been carried on about cultivated l grazing areas to protect growing farm crops and forage, and red food and feed has been protected from rat and mouse damage meeting increased demands from many areas for cooperative

assistance. Rat and mouse destruction of grain in elevators and mills has been severe. Toxic baits have been used extensively in combating it, but sanitary and rat-proofing methods of control have been stressed to insure more lasting results. Cooperation has been extended to counties and cities in organizing intensive permanent rat-control projects and to State, county, and local livestock organizations and individuals in organizing and supervising intensive control programs to protect sheep, goats, cattle, pigs, and poultry from the larger predators, thereby safeguarding the Nation's meat resources. In 4 counties in South Dakota and 6 in North Dakota cooperative control operations reduced the average annual sheep loss to coyotes from 10 to 2 percent. Application of the Service's rat-control methods stopped the following losses: \$10 weekly to foodstuffs in a grocery market in Florida, \$300 annually to a turkey grower in Maine, and \$2 a ton on 2,000 tons of stored feed at a cottonseed oil warehouse in Texas. Rats were controlled also in a military warehouse and an airport hangar in Texas, where they were cutting cords from parachutes and chewing fabric and stitching off the wings of training planes. In September, a Service hunter reduced destruction by taking 6 coyotes in 6 days from an area in Nevada, where, during a 14-day period, 3 purebred Hereford calves valued at \$50 each were lost. In Catron County, N. Mex., cooperative pocket gopher control effected a 25-percent increased yield of potatoes from a 20-acre field. The carrying capacity of a 40-acre pasture in Beaver County, Okla., increased five times after removal of prairie dogs at a total cost of \$3. Capture of one bear that killed 20 adult sheep last fall in Summit County, Utah, ended depredations.

Conserving Raw Materials for Clothing

In the Western States the more than 37,000,000 adult sheep and lambs that graze on open ranges that are infested with coyotes and other large predators have been protected by the Service's cooperative control operations conducted over the greater part of the range areas, and thus losses of essential raw materials have been reduced.

The need for wool for clothing to meet the Army estimate of 100 pounds of scoured wool for each man during his first year in service makes it a matter of grave concern to maintain and if possible increase the output of domestic wool, the only supply deliverable in quantity to our mills without undergoing the hazards of marine transportation. The requirement of 15,000,000 shearling pelts for lining aviators' coats exceeds the present supply. Lanolin, a byproduct of wool, is needed in quantity to insure the smooth operation of war machines.

In western Wyoming a livestock outfit lost 80 valuable range sheep to coyotes during January and February, but losses stopped after a

Service hunter took 42 coyotes. In Montana, a producer in Meagher County running 5,000 head of sheep reduced annual losses from 7 to less than 2 percent by organized predator control, and in Yellowstone County a Service hunter stopped losses by taking a female coyote which had killed 15 of 25 lambs in a short period. During February in Clatsop County, Oreg., the capture of a single crippled coyote, named Two-Toes, which was known to have killed 250 lambs and 40 sheep over a 3-year period, prevented further losses. The taking of 1 coyote charged with killing 125 sheep and goats during a short period in Garza County, Tex., ended the trouble, and losses were stopped in Garza County, Tex., by taking an old female wolf reported to have killed 50 lambs and 14 sheep.

Safeguarding Public Health

During the national emergency, greater attention must be given to the part played by rodents and predators in the dissemination of zoonotic diseases. Outbreaks of bubonic plague, rabies, typhus, infectious jaundice, and Rocky Mountain spotted fever, all of which are transmissible from wild animals to man or to livestock, have occurred, some of them near military areas; and the Service has worked closely with war agencies, the United States Public Health Service, State and local health units, and other cooperators to reduce the number of disease-carrying rodents and predators. Rat control was inaugurated at Fort Lupton, Colo., to overcome infectious jaundice, and in Miami and in Dade County, Fla., and New Orleans, La., in cooperation with city and county health departments, to suppress typhus fever; and in San Antonio, Tex., cooperative rat-control operations reduced the positive laboratory-tested cases of typhus from 80 to 1. During the spring, 30 people in southern New Mexico were required to take the Pasteur treatment for rabies, when an outbreak occurred among coyotes. Valuable livestock also were infected, but increased predator-control operations are being carried on in the hope of soon suppressing the disease. In Bryan County, Ga., Rocky Mountain spotted fever caused the death of an attending physician and one member of a family of six. Pocket gophers were found to be infected with the ticks that transmit the disease, and control measures were promptly applied. Experts from the Service have been commissioned in the Sanitary Corps of the Army to supervise rodent control on military areas. Systematic repressive work is being conducted in cooperation with the Gulf Coast Health Unit, which is responsible for work on epidemics in coastal parts of Texas. Control of ground squirrels in and around the army air base at Boise, Idaho, where bubonic plague was found by the Public Health Service, was continued.

Fishery Industries

Technological fishery investigations and broad statistical work are functions delegated to the Service by a Congress desirous of increasing, promoting, and developing an industry that although vast in ramifications and great in significance to the economy of the Nation is composed of units too diverse to carry out these essential functions for themselves. Thus, the fact-gathering facilities of the Service have been placed at the disposal of the commercial fishing industry both to their benefit and to that of the public. By developing orderly marketing procedures and more efficient methods of handling raw materials, conservation of fishery resources is promoted, the Nation's nutritional level is improved, and great quantities of foodstuffs are made available to meet wartime emergency conditions.

Fishery Exploratory Investigations

During the spring, the United States Government in cooperation with other American Republics and with the Government of the West Indies, undertook through this Service, an inquiry into the fisheries of the Caribbean Sea. Information thus far collected indicates that the fisheries in some localities can be materially extended. Undoubtedly new industries can be developed in the fishery resources of South America and the West Indies and areas not now visited by commercial fishermen can be made highly productive, developments that are particularly important in wartime. Such cooperative studies off the coast of neighboring Americas result not only in augmenting the total food supplies of the Americas, but also in strengthening general relationships among the American Republics.

Investigations to Improve Fishery Technology

In technological fishery work the Service is concerned chiefly with problems in the production, preservation, and utilization of fish products and byproducts. Investigational work conducted in the laboratories at College Park, Md., Seattle, Wash., Ketchikan, Alaska, and Mayaguez, P. R., made use of applied chemistry, bacteriology, and engineering in the improvement of current practices and the development of new methods and products.

War has created a multitude of new fishery problems and an increasing dependence upon scientific research for their solution. Previous technological work is now proving of direct value in increasing and extending fishery activities the better to meet present and future needs. When early in the war it became apparent that increasing disruptions in world trade were likely to develop short-

number of items necessary to public well-being that are derived principally from the fisheries, technological programs were revised to include investigations of possible new sources of these items or suitable substitutes. A partial substitute for imported agar was developed; empty bottles were shown to be desirable as substitutes for imported glass floats formerly used on subsurface gill nets; and it was found that a high quality poultry feed can be prepared from dogfish and shark carcasses—now discarded by the shark-liver fishery—thus supplementing the vital domestic supply of protein concentrates. For more efficient utilization of raw material in manufacturing fish meal and fish oil, additional information was obtained regarding the digestibility of fish proteins during the reduction process. Conversion of tarfishes and other oyster pests into substitutes for some of the materials that may not long be available is being studied.

Increasing demand for vitamin A for domestic consumption and for distribution under the lend-lease program directed greater attention toward possible new sources of raw materials, and caused data to be obtained regarding more efficient vitamin A recovery from existing supplies and studies to be undertaken to establish standards of quality. Increased Government buying of canned salmon, pilchards, sardines, and mackerel so reduced the supply for domestic needs that it was sought to develop new canned products from species not previously included in canning or considered of only limited utility. With the increased demand for dehydrated foods for transport abroad, attempts are being made to devise more efficient methods of dehydrating fish.

Investigations to Improve the Economics of Fisheries

Continued studies in fishery economics resulted in two published reports, one dealing with the retailing of fish in 56 cities in the Eastern States and the other with similar information on a regional basis for parts of the upper Ohio River Valley. In addition, brief studies were made with the object of providing necessary information to the Office of Price Administration, the War Production Board, and other emergency agencies and to the trade interests appearing before governmental bodies.

As war activities intensified, the drainage of manpower and vessels from the industry became more serious. Lowered production in combination with vast military and lend-lease purchases reduced civilian supplies of certain fishery commodities. The market development work of the Service was gradually reoriented to meet the situation. Of chief concern now are the encouragement of those fisheries most susceptible of stimulation under war conditions and a adjustment of fish consumption to meet new conditions of supply. The marketing of varieties not usually produced in large volume is

being encouraged and the public is shown how to make the most of them. Consumer information was aided by the establishment of defense councils under the auspices of the Office of Civilian Control and of information centers encouraged by the Office of War Relocation Administration.

The territories of field agents were enlarged, and agents were given new assignments to cover specific problem areas. More use was made of the heavy runs of Great Lakes smelt and herring which were related through work with producers, dealers, and consumers. Fish plant operators were shown how they could make fish more readily available in the Midwest by establishing contacts with producers, dealers and using their refrigeration facilities. Army purchases helped to get a variety of fishery products beyond that furnished by the more common species and to get the species favored by consumers from specific regions. Problems of obtaining adequate quantities and the desired methods of preparation also were solved. Fish plants and schools were helped to add variety to their cafeterias by greater use of fish. Efforts were made to facilitate the entry of canneries producing interdicted commodities into the fishery products.

Fishery Market News Service

From field offices of the Fishery Market News Service at New York, Boston, Chicago, Seattle, Jacksonville, and New Orleans, the latest available information on production and shipment of fish products and marketing data on supply, demand, and price is put out in daily mimeographed reports, telegraphic bulletins, and radio broadcasts to fishermen, shippers, wholesalers, buyers, and consumers. This market news service has been conducted long enough to build up a valuable backlog of fishery data and experienced personnel capable of meeting increased wartime demands.

In order that the fishery resources may be utilized to the maximum extent consistent with conservation, detailed periodic surveys of the most important markets are prepared. These and the daily releases on production and current prices furnish the War Relocation Administration with the data needed for regulating our food supplies with price and quantity controls. Thus, quickly recognized, surpluses may be removed and shortages remedied, and military purchase of fishing vessels may be based on the daily reports and the effects gaged almost as fast as the vessels are withdrawn from the fishing fleet. Since Pearl Harbor, military officers and mess sergeants have been placed on the daily reports lists in order that with a knowledge of market conditions they may request bids for sea foods, and suppliers are kept informed.

Army's requirements and Federal specifications. Former Federal specifications for fresh fish were revised to meet military needs and to conform more closely to current commercial practices. The first step in the direction of establishing standard Federal specifications for sea foods and in enabling purchasing officers to buy fish and fish more economically was the issuance of a Fresh and Frozen Fishery Products Reference Manual, a supplementary number of the Service's monthly periodical, Fishery Market News. The text is replete with tables and diagrams embracing information of paramount importance to the fishing industry as well as to the military service. It is intended primarily for use in procuring supplies of fishery products for the armed forces, it includes data on seasons of abundance, standard market forms, food and fuel values, edible portions, fat content, packing containers, methods of cooking, basic recipes, and related information.

Collection and Dissemination of Fishery Statistics

The collection of essential statistics relating to the yield of fishery products, the employment of men, craft, and gear, and the production of manufactured fishery commodities was continued, and new surveys were undertaken to provide specific current information required by military war-training agencies. With expanding civilian and military demands for fishery products for food and industrial uses and with increased demands placed upon these by lend-lease commitments, the commercial fisheries have been subjected to unusual strain. To help the industry fulfill its obligations, many statistical services have been developed in getting priorities, matériel, and Federal aid. A survey is in progress to learn the exact requirements of the fishery industry so that locations and priorities can be most efficiently determined and fishery production maintained. Data are being gathered upon fuel-oil requirements, and vessels operated and needed. This will guide, especially the War Production Board, the Navy Department, and the Office of Petroleum Coordinator for War in their respective fields. For use in the price-ceiling schedules the Office of Price Administration surveys were conducted to determine the production of vitamin A fish-liver oils for human consumption, the normal stocks on hand, and the sales, prices, and anticipated production. A similar survey on vitamin D oils for presentation to various war-planning agencies was made. Finally, the War Relocation Authority Board was supplied with statistical information on the effects of Japanese purchases of fishing vessels upon landings of fishery products.

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The territories of field agents were enlarged, and agents were given roving assignments to cover specific problem areas. More effective use of the heavy runs of Great Lakes smelt and herring was stimulated through work with producers, dealers, and consumers. Locker-plant operators were shown how they could make fish more readily available in the Midwest by establishing contacts with producers and dealers and using their refrigeration facilities. Army purchasers were helped to get a variety of fishery products beyond that furnished by the more common species and to get the species favored by personnel from specific regions. Problems of obtaining adequate quantities and the desired methods of preparation also were solved. Industrial plants and schools were helped to add variety to their cafeteria menus by greater use of fish. Efforts were made to facilitate the conversion of canneries producing interdicted commodities into those canning fishery products.

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Game Law Enforcement

Administration of Conservation Laws

The principal Federal wildlife-conservation statutes administered by the Service are (1) the Lacey Act; (2) the Migratory Bird Act; (3) the Migratory Bird Conservation Act; (4) the Mammal and Bird Hunting Stamp Act; (5) the black bass law; (6) a law protecting wildlife and property on Federal refuges (sec. 84, Criminal Code); and (7) through the Alaska Game Commission, the Alaska Game Law of 1925, as amended.

Amendments to the Migratory Bird Treaty Act regulations: canvasback and ruddy ducks from the list of species that were limited to 3 in the daily bag, legalized in 15 States the possession of a duck, prohibited the use of cattle, horses, or mules as blinds, and the weekly limit on geese in certain counties of North Carolina, California, and Illinois, closed the season on Wilson's snipe, and the mourning dove season to 42 days.

Work of Game-Management Agents

The 74 regular Federal game-law enforcement officers, singly and in cooperation with State agents and United States deputy game warden, obtained evidence in 2,892 cases of game-law violations. In State and Federal courts, these resulted in 2,711 convictions (see p. 5). By undercover operations under rules approved by the Secretary, and with an expenditure of \$599.89, game-management agents obtained evidence in 54 cases, 11 of which are pending; and in 11 already tried, fines of \$2,385 and jail sentences of 15 months were imposed.

Cases of violation of the Migratory Bird Treaty Act disposed of during the year, and cases still pending on June 30, 1942

<i>Disposition</i>	<i>Number</i>	<i>Pending</i>
Conviction.....	552	From preceding year.....
Dismissal.....	73	New cases.....
Nol-pros.....	36	
Found not guilty, jury trial.....	3	Total.....
Closed without prosecution.....	15	Disposed of.....
No bill rendered.....	5	
Closed by death.....	1	Pending at end of year.....
Total.....	685	

5.—Summary of penalties imposed during the year for violations of wildlife-conservation laws

Act	Convictions	Fines and costs	Jail sentences
	Number	Dollars	Days
✓ Bird Treaty Act.....	552	17,826.71	1,426
✓ Bird Conservation Act.....	43	1,215.00	130
✓ Bird Hunting Stamp Act.....	57	879.00	
Refuge Trespass Act.....	2		40
Mississippi River Wildlife and Fish Refuge Act.....	13	235.00	
.....	3	271.40	
Prosecutions resulting from Lacey Act Investigations.....	111	5,895.40	513
Cooperative prosecutions.....	1,927	60,282.45	1,304
.....	2	225.00	
.....	1	89.90	
Total.....	2,711	86,919.86	3,508

Importations and Permits

war conditions caused a decrease in importations of birds and plants from 1,640 to 1,371, including 4 at Honolulu; and the number of shipments inspected from 250 to 154. Denied entry were 1 monkey from India, 2 crested mynas from China, and 2 bullfinches from Japan, which were destroyed or returned to the shippers. Birds imported, including 6,389 canaries, 100 parrots, and 37,490 Mexican quail, totaled 56,211, compared with 89,028 last year. Among animals imported were 6,024 Rhesus monkeys compared with 3,655 last year, 68 black bear cubs from Canada, 2 giant pandas from China, 8 gorillas from the Belgian Congo, 1 Chilean fox, and 1 vampire bats from the British West Indies.

Scientific collecting permits issued aggregated 320, bringing the total to 1,779. Scientific possession permits numbered 604, and 125 were issued to 132 individuals to possess specimens found dead. Hunting permits numbering 2,363 are in effect.

Propagation permits issued to possess migratory waterfowl numbered 258, and to take migratory waterfowl, 13; 632 propagating permits were canceled, and 3,716 are outstanding. Permittees reported existing in captivity of 3,101 wild geese and 76,072 wild ducks, of which 71,325 were mallards. Sale of propagated migratory waterfowl included 31,921 ducks and 329 geese for food, and 11,545 and 1,550 geese for propagation. Propagated birds liberated included 12,611 ducks, 234 geese, and 33 mourning doves.

Predation permits were issued in 758 instances to protect crops, and property, but only after investigation by game-management officials disclosed frightening devices to be ineffective. Other permits numbered 29 for taking birds and mammals in Alaska and 8 for taking fishes for bait from the waters in the District of Columbia.

Shore station and two whale catchers were licensed to capture whales along the California coast and to process them for which the wharves received a fee of \$1,000.

Alaska Fish and Wildlife

Fishery Laws and Regulations

Under the broad principles laid down in the act of June 1908 whereby the Department is vested with full authority and responsibility for regulating the time, place, and method of commercial fishing in Alaska, the Service continued its established program of protection and conservation of the fisheries to assure a sustained yield. The Director and other officials spent several weeks of territory giving attention to problems pertaining to management of aquatic resources. After the close of the fishing season, public hearings at which the Director presided were held at seven points in Alaska and at Seattle, Wash., to obtain recommendations and testimony regarding fishery regulations. Revised regulations were based upon the testimony presented at these hearings and upon investigations conducted by fishery biologists and law-enforcement officers of Alaska. Vigilant control over the fishery resources is necessary to prevent unwise exploitation in the period of national emergency when current market demands stimulate increased operations. The Department's regulations are meant to provide a sustained yield of fishery products; any prolonged emergency will not find the Nation lacking in fishery products.

In protecting the fishing grounds, 12 patrol vessels, 13 seaplanes and a number of other small powerboats, effectively supplemented Government-owned and chartered airplanes, were used. Personnel engaged in fishery protective work numbered 190, including management agents, stream guards, weir operators, vessel inspectors, and biologists. In addition, 11 wildlife agents of the Alaska Game Commission were deputized to assist.

Throughout the season, careful observations were made of the time and condition of the salmon runs and escapements, for guidance in modification of the regulations. Weirs for counting the escapement of spawning salmon were operated in 10 representative streams. Biological investigations concerning the salmon and hatcheries were continued.

Products of the Fisheries

The total output of Alaska fishery products in 1941 was 42,000 pounds, valued at \$63,439,593, compared with 323,507,000 pounds valued at \$36,441,000 in 1940. The estimated value of the products to the fishermen was about \$15,512,000, or about \$5,000,000 less than in 1940. The number of persons employed in the various branches of these fisheries increased from 25,199 in 1940 to 27,000 in 1941.

Salmon products represented about 83 percent of the weight and 92 percent of the value of Alaska fishery products in 1941. Canned salmon made up 93 percent of the output, the pack amounting to 6,932,040 cases, or 332,737,920 pounds, valued at \$56,217,601, an increase of about 37 percent in quantity and 79 percent in value over the 1940 pack. Red salmon comprised 17 percent and pink 67 percent of the total pack, as against 19 and 58 percent, respectively, in 1940. There were 109 canneries in operation, 9 more than in 1940, and the number of persons employed increased from 19,666 to 21,994.

In the herring industry, the number of operated plants dropped from 24 in 1940 to 13 in 1941. This decrease was due principally to the number of small plants closed in central and western Alaska and had little effect on the total production.

Halibut landings of the Alaska fleet decreased 5 percent in quantity but increased about 8 percent in value over 1940. Several of the minor fisheries made gains over the previous year, but there was a marked decline in the production of clams, shrimps, and crabs, owing chiefly to labor disputes and to the scarcity of labor.

Pribilof Fur Seals and Blue Foxes

Sealing on the Pribilof Islands and the incidental foxing operations were carried on by the natives under supervision of white employees. In all, 95,013 fur seal skins and 834 fox skins were obtained.

At the fur seal byproducts plant on St. Paul Island there were produced 35,000 gallons of No. 1 blubber oil; 19,610 gallons of No. 2 press, or carcass, oil; and 747,546 pounds of seal meal. All the meal and 39,610 gallons of oil were shipped to Seattle and sold through competitive bidding.

The annual supplies for the Pribilofs were shipped from Seattle on the U. S. S. *Spica*, through the cooperation of the Navy Department. The Coast Guard also cooperated in patrolling waters of the North Pacific Ocean and Bering Sea for the protection of fur seals and sea otters. The Service vessel *Penguin* made five round trips between Seattle and the Pribilofs, transporting supplies and personnel.

The Fur-Seal Treaty of 1911 expired on October 23, 1941, 1 year after formal notice of abrogation had been given by the Japanese Government. As the expiration was not until after the 1941 sealing season, both Canada and Japan normally would be entitled to the usual 15 percent of the season's take. Canada will receive her share, but in view of the existing state of war, the eventual disposition of the Japanese share has not been determined.

The estimated number of animals in the Pribilof Islands fur seal herd as of August 10, 1941, was 2,338,000 or 153,000 more than in 1940, an increase for the herd of about 7 percent.

Two public auctions of fur seal skins were held at St. Louis, Mo. In September 29,668 sold for \$1,363,310.50, including 8,246 dyed black, 8,701 safari brown, 12,075 matara brown, and 646 raw and partly processed; and in April 30,695 sold for \$985,839.75, including 6,101 dyed black, 10,387 safari brown, 13,848 matara brown, and 359 raw and partly processed. In addition, 2 sealskins were sold for \$105.11 at a special sale authorized by the Secretary. In all, 60,365 seal-skins were sold for the account of the Government for a total of \$2,349,254.96.

The care of blue foxes on the Pribilof Islands is incidental to sealing activities. Of the 834 fox skins taken, 182 were from St. Paul Island and 652 from St. George Island. There were sold at public auction 640 blue and 11 white fox skins taken on the islands in the 1940-41 season. The blue pelts brought \$11,634, and the white \$236.50, a total of \$11,870.50.

Japanese Activities in Bering Sea

A Japanese fishing fleet, comprising the floating plant *Kosei Maru* of Tokyo and 8 trawlers, also the *Tenyo Maru* and the *Sugura Maru*, and numerous small tenders, engaged in fishing operations in the Bering Sea in 1941. The fleet arrived off the northern coast of the Aleutian Islands in May, worked northward past the Pribilof Islands, and spent the greater part of the season fishing in the waters between the Pribilofs and Nunivak Island and elsewhere. The fleet withdrew from the Alaska coast sometime in July. Apparently the catch consisted chiefly of halibut and cod.

Enforcement of Alaska Game Law

The regulations approved for the 1942-43 season under the Alaska game law prohibit the taking of mountain sheep anywhere in Alaska, reduce the bag limits on deer and caribou, and generally shorten the open season on all game animals. On brown bear the bag limit was reduced to one in the Kodiak-Afognak Islands, and a closed season provided on the Alaska Peninsula west of Herendeen Bay. An open season on marten is allowed throughout the Territory, except on Prince of Wales, Baranof, and Chichagof Islands.

With the purchase of 2 more airplanes, the Commission now operates three 4-place and two 2-place planes based at Ketchikan, Anchorage, Dillingham, and Fairbanks, in addition to three salt-water patrol vessels, 4 river boats, 13 automobiles, and numerous outboard-motor craft.

Office of Indian Affairs

JOHN COLLIER, Commissioner

IT IS probably difficult for the average layman to understand why an agency such as the Indian Service becomes immediately and directly involved in the war. The Office of Indian Affairs has a wide range of responsibilities, covering almost every aspect of human living for a group of some 350,000 Indians in the United States and 33,000 natives of Alaska. In an all-out war these people are vitally affected. Indians who have heretofore lived in isolated areas on reservations suddenly find themselves part and parcel of the national war program. Their young men volunteer or are drafted. Both men and women enter war industries in large numbers. Blocks of their lands are requisitioned for cantonments and bombing ranges, and in the case of natives of the Aleutian Islands the war comes to their very door steps. Consequently, the Indian Service finds itself devoting much of its time and effort to problems arising directly from the war.

Indian Service Administers War Relocation Center

One of the major war connected tasks of the Service had to do with the evacuation and relocation of Japanese from the West coast. Even before the creation of the War Relocation Authority, the assistance of the Indian Service was sought in the handling of this problem. Within a few days after the creation of the WRA arrangements had been made to utilize a portion of the Colorado River Indian Reservation in western Arizona, upon which to locate some 20,000 evacuees. This project, the largest of all the centers established to handle evacuees, is being administered entirely by the Indian Service under an agreement with the War Relocation Authority.

There are approximately 1,200 Mojave and Chemehuevi Indians living at the northern end of the reservation. They have irrigated and cultivated some 8,000 acres of land by pumping water from the Colorado River. Several years ago the Indian Service planned the

subjugation of approximately 100,000 acres of land within the boundaries of this reservation lying along the eastern bank of the Colorado. Inasmuch as the resident Indians could use not more than 15,000 or 20,000 acres, it was planned over a period of approximately 15 years to colonize on the newly developed land Indians from other reservations, such as the Navajo, Hopi, and Papago, where land resources are utterly inadequate to meet the needs of the existing population. In 1942, the Indian Service completed the construction of a diversion dam across the river. In May, the main canal from the dam was connected with the irrigation system used by the Indians, substituting gravity water for the water previously pumped.

Several miles to the south of the land occupied by the Indians the War Department has built three communities for evacuees. The first accommodates 10,000 colonists and each of the other two accommodates 5,000. A ditch from the Indian irrigation system to the relocation center delivers water to the communities in order to provide for the planting of grass and shrubs around their homes. The colonists are clearing and leveling land in the vicinity of the communities and crops soon will be planted to aid in their own subsistence. Eventually it is expected that they will clear, level, and irrigate 25,000 acres, planting this with subsistence crops. After the war the evacuees will be removed from the reservation and these newly developed lands will be used by members of the Colorado River tribe, and of other tribes to be colonized there.

The War Department, under contract, built the communities, but upon completion, moved out and turned them over to the Indian Service to administer. The Service found it necessary to transfer many of its best personnel to the project in order to get it under way promptly. The superintendent of the Papago Reservation was detailed to become the director of the project and the superintendent of the Truxton Canyon Reservation was detailed as his associate. Many other employees of the Service were detailed to various types of work within the project.

One of the major problems was to provide necessary school facilities for the 6,000 children of the colonists. These schools had to be designed, built, equipped, and staffed between the first of July and the opening of the school term. The colonists themselves aided in the construction.

These buildings were constructed of adobe, thus making the maximum use of the labor of the colonists, both skilled and unskilled. Buildings of this type are more useful in the hot climate.

The difficulty of securing adequate medical personnel and the delay in the completion of the hospital units placed increased burdens upon the project staff. Furthermore, the lack of adequate medical facilities caused considerable anxiety and insecurity among the colonists.

ously, the problems of 20,000 people living under most adverse conditions are very acute. These were further complicated by the uncertainty of the future and the tremendous shock incident to their being uprooted, and moved from their homes into a new and utterly different life. In spite of these conditions, the rate of sickness has gradually declined.

The experience of the Indian Service with a minority group over 17 years is proving invaluable in the administration of the Center. With both the Indians and the evacuees the major objective is to help functioning local democracies. The colonists have elected a representative government. Local courts and all aspects of municipal government have either been formed or are in process of formation. Smith's intensive training in the principles and procedures of cooperatives was arranged in response to the request of the colonists that sports, amusements, and personal services of all types, be conducted on a cooperative basis. In cooperation with the Friends Service Committee and St. Johns' College a program of adult education has been initiated. Other types of adult education are also planned. Freedom of liberty of speech and assembly is granted the colonists.

Relocation Center on Gila River Reservation

On the Gila River Reservation, in southern Arizona, an additional 100 evacuees are being placed. Here the War Relocation Authority is leasing 7,000 acres of land which the Indians have held in a large communal tract and which they have operated for cash income in order to take care of their irrigation costs. On these lands the colonists plant crops for subsistence. They will clear and level an adjacent 100-acre tract and construct laterals and bring this land under irrigation. Upon the termination of the war this improved land will revert to Indian use. Many of the Indians are employed upon community construction at these two centers.

Japanese Invade Aleutian Homes

Prior to the attack on Dutch Harbor, plans were being developed in cooperation with the Naval authorities for the possible evacuation of the Aleutians. Immediately after the attack these plans were put into effect and all of the natives of the islands west of Dutch Harbor were evacuated to the mainland. It became necessary for the Indian Service, in cooperation with other agencies, to make arrangements for the relocation of these evacuees, to house them, to provide necessary food and medical care, and to plan for their future self-support. Many of the Indian Service teachers in Alaska are licensed radio operators under the Federal Communications Commission, and their

responsibilities for maintaining communication with the authorities as well as for looking after the welfare of the Indians and Eskimos are of prime importance during wartime.

Indian Service Hospital at Unalaska Bombed

Across the narrow bay from Dutch Harbor lies the little town of Unalaska. In the bombing of Dutch Harbor, one bomber sacrificed itself from the squadron and devoted its efforts to the destruction of buildings at Unalaska and the machine gunning of citizen streets. The Indian Service hospital was struck and partially destroyed. The civilian defense organization had functioned perfectly and every patient, nurse, and physician had been removed to sheltered quarters.

Enemy Attack Expected

Since the outbreak of war, Alaska's Indians and Eskimos, totaling 50 percent of the peacetime population, have expected enemy attack, and are prepared to meet it. The United States forces in Alaska contain a number of natives, whose special training is of inestimable value. Alaskan natives are accustomed to all day on snowshoes, are skilled in the use of rifles and knives, have first-hand knowledge of the geographic and climatic conditions of the Arctic region, and are accustomed to its peculiar temperatures. These are factors of prime importance in territorial defense.

The full support of Alaskan natives to the United States Government is manifested by their eagerness to enlist in the armed forces and by their generous purchases of war bonds. The largest purchase of war bonds in the Territory for the month of December came from Indians and Eskimos, who presented Gov. Ernest Gruening with a check for \$110,645.72.

A few days after the outbreak of war, Alaska organized an organized civilian defense program.

There is much yet to be told of the courageous work of the Alaska National Guard Service men and women and the inspiring role of the Alaska natives in defending their homes and giving their lives in the war for freedom.

Indian Lands Used for Army Purposes

Many requests for use of Indian lands and other facilities for a variety of purposes were made during the year by both the Army and the Navy.

For example, the enlargement of a camp and the establishment adjacent to it of a large bombing range necessitated the almost

removal of some 50 Indian families located in the area. It was necessary to purchase additional land for them, to provide housing to rehabilitate these families in new locations. Almost at the same time the demand of the War Department for an aerial gunnery range necessitated the removal of more than a hundred families to another part of an Indian reservation. There is little tribal land on this reservation; most of it is individually owned or held by allottees and their heirs under restricted or trust title. Therefore, it was necessary to purchase land for these families and to provide them with the necessary livestock to make themselves self-supporting in their new location. The Metlakhatlans in Alaska made part of an island available to armed forces.

The Attitude of Indians Toward the War

One would expect the Indians of the United States to be confused and perplexed by the war situation. Essentially they are a rural people. Many of them live in remote areas, speak only their native languages, and have little access to newspapers, radio, or other forms of communication. How could they be expected to understand the intricacies of ideologies which has precipitated the world crisis?

Moreover the treatment which the Indians received at the hands of the Federal Government during the past century and a half might very well have alienated their sympathy and loyalty and left them disgusted in the Nation's welfare and unwilling to defend it against its enemies.

From the very beginning, official attitude toward the Indians was largely one of intolerance and repression. They lost much of their land through forced treaties and were pushed back onto reservations which the Government promised to preserve. Treaties were broken, promises pledged ignored, and more and more of their land taken from them.

Finally through the forced allotment of many of the reservations much of their remaining land was lost to them and their social organization destroyed and their tribal culture driven under cover.

This "liquidation of the Indian" was accomplished by the destruction of his ways of earning a livelihood, by the wiping out of the buffalo, the Indian wars in which the slogan was that the only good Indian was a dead Indian, and by a vigorous campaign of education and regulation to stifle Indian languages, arts, and ceremonials.

Although Federal policies for the past 12 years have been completely reversed, Indians are still experiencing discrimination on every hand. In at least three States Indians are still refused the right to vote. They are often discriminated against in industrial

employment; are the last to be taken on the job and the first to be let off. In many areas even where they are permitted to live have been in a large measure debarred from participation in the life of white communities. How, one might ask, could they be expected enthusiastically to take up arms in the defense of the white community which has treated them in this fashion?

Strange as it may seem the Indians have responded eagerly and even enthusiastically to the challenge of the war. From the remote parts of isolated reservations has come evidence of Indian participation over the war. More than once an Indian, or a group of Indians, has shown up at agency headquarters, each man with his gun, to register for selective service and to proceed immediately to the front of fighting. Prior to the Japanese assault at Pearl Harbor the Indian in the Army alone numbered 4,481, of whom approximately 50 per cent had enlisted either in the Regular Army or the National Guard. The rate of enlistment increased very substantially since the outbreak of war, until on June 1, 1942, more than 7,500 Indians were in the armed forces. While this seems relatively a small number it represents a larger proportion than any other element of our population.

Of record in Washington are purchases of \$1,270,000 in war bonds from April 1, 1941, to March 1, 1942. Additional purchases aggregated approximately \$750,000.

The Crow Tribe of Montana offered the Government its own resources and all of its manpower. Even the girls and women were tempted to enter active military service.

The California Indians, especially, have been at odds with the Federal Government since 1850, and yet the Mission Indian Legion, with 3,000 members from 30 reservations telegraphed President Roosevelt and Governor Olson "a message of loyalty and resolve to serve our great Nation."

Indians are serving in almost every corner of the world. American forces are in action. Large numbers were killed. Occasionally individuals are singled out for honors. The first Indian soldier thus far has been the late Maj. Gen. Clarence C. Roberts, an enrolled member of the Osage tribe, who was lost in the attack on Midway. Major General Tinker was placed in command of the Hawaiian Air Force shortly after Pearl Harbor. In the attack on Midway he selected himself to lead a bomber attack on the Japanese navy. Flyers in the same formation with General Tinker were shot down; that his plane was last seen descending rapidly into the sea. Although a careful search was made of the area, no trace was found of the bomber or its occupants.

Lt. Gen. Delos C. Emmons, Military Governor of Hawaii, in the command of the Hawaiian Department, praised General Tinker's

y and skill in a statement which he issued shortly after the Air
Commander was reported missing. General Emmons said:

The entire Hawaiian Department mourns the loss of Major General
er and his gallant crew.

Because General Tinker would not ask his subordinates to under-
take risks he himself would not take, he selected himself as flight
leader of an important combat mission requiring great courage, skill,
and experience.

He died knowing that he had had an important part in winning a
victory. His leadership was an inspiration to his command and
his loss is a deep personal one."

It may not be too great a stretch of the imagination to suggest that
Indians have identified the struggle of democracies the world over
with their own struggle of the last century. It may be that they see
the victory of the democracies a guarantee that they too shall be
permitted to live their own lives. Perhaps their experiences of the
10 years in which there has been a rebirth of spirit, a reviving of
smoldering fires of local democracy, and a step toward economic
stabilization have helped them to see the possibilities in a world of
"Four Freedoms."

A few instances lifted from the official record will serve to show
something of the spirit with which they approach the world crisis:

Immediately after Pearl Harbor, the Indians of the little village of
Santa Ana in New Mexico left their homes and went secretly to their
sacred shrine. There in their former home, long since abandoned,
the entire Pueblo remained for one unbroken month in secret prayer.
Their prayers were for the people of all the world. News of the pil-
grimage became known only when the Indians sent word to the author-
ities that they intended to build a great fire at the conclusion of their
pilgrimage. They wanted the Army to know that this was a sacra-
mental fire and not the result of sabotage or overt enemy action.

The Pueblo of Zia, also a little village in New Mexico, engaged in
it before the second selective service registration. In the Pueblo
of Santa Ana in New Mexico the Red Cross drive was announced from the
beginnings and the canvassing started in a blinding snowstorm. Each
household contributed wheat, corn, or hay, or whatever there might
be available. One family donated \$6 and two rings.

The great Navajo Tribe, numbering some 50,000, was so stirred by
the country's declaration of war that its tribal council laid aside its
business and spent almost an entire day in patriotic demon-
strations, plying the superintendent with questions about the flag
and its meaning, questions as to how the Navajo Tribe could best
contribute to the prosecution of the war. Even the old people were
determined that they be allowed to enlist and the action of the Selective
Service officials in turning down many young Navajos because of their

inability to read and write or speak the English language has been felt very keenly by the entire tribe.

There is some evidence among the Indians of confusion over their legal obligations and responsibilities under the Selective Service Act. During the last war most of the Indians in the United States were not citizens, and were, therefore, declared not to be subject to conscription. Only those few who were citizens were required to register. A very large number volunteered, however, and made an enviable record.

In 1924, Congress passed an act which conferred citizenship upon all Indians born in the United States who had not already acquired such citizenship. The courts have now held that by virtue of this conferring of citizenship the Selective Service Act is applicable to all Indians. That they should be exempted in one war and drafted in the second has created some confusion. It has been necessary for agency officials patiently to explain and to interpret.

The unique legal status of Indian tribes as separate political communities has further confused some of the Indians with regard to their status under the Selective Service Act. Indian tribes have many inherent powers—far more than the average municipality. They possess all of the powers of a sovereign nation except those specifically infringed by acts of Congress or by treaties. Several tribes, conscious of these powers of self-government, have made declarations of war upon the Axis Powers. Notable in this regard was the action of the Six Nations of the Iroquois confederacy. Delegates of this historic government, representing the 6,000 Indians who reside on eight reservations in New York State, came to Washington early in June to present to the President and to the Congress their formal declaration of war against the Axis Powers.

Indians in Wartime Industry and Agriculture

The Indians are playing an important role in the agricultural and industrial production program of the war. Skilled Indian workers are to be found scattered throughout important war industries in almost every section of the country. They are doing highly technical jobs in aircraft industries on the West coast, in Kansas, and in New York State. They are to be found among the crews constructing bases in far-flung parts of the world. They are handling skilled jobs of every description—welding steel, operating jack hammers, and handling some of the most difficult machine operations. Under the program of the Indian Service during the past 10 years thousands of Indians were employed in the building of truck trails, look-out towers, highways, and soil conservation structures. They demonstrated

marked ability to learn to operate heavy machinery of all kinds. Hundreds of other young Indians were trained in Indian schools in sheet metal, welding, auto mechanics, radio maintenance, and other industrial trades and are now employing their skills in airplane plants, tank factories, and shipyards.

Indians Grow Food for Freedom

Reports coming to the Indian Office indicate that there has been a 15-percent increase in the number of gardens planted by Indians this year and a 35-percent increase in acreage. Field crops are reported 18 percent greater and the spring pig crop 25 percent greater than last year. Indian livestock increased by 35 percent during the first 6 months of this year and sheep by 50 percent.

Every acre of grazing land not essential to Indian operation is being made available for permittees.

The unsettled conditions in Alaska make uncertain at the moment the output of the canneries operated by Indians. They have been urged to make every effort to increase their packs, but the availability of transportation and cans will partially determine the success of these efforts.

The Indians of the Red Lake Reservation expect to market a million pounds of fresh fish during the present season.

Timber Production

In connection with timber production, the Office recently approved a sale of spruce on the Quinault Reservation for airplane production. A contract has been let on the Warm Springs Reservation for one-half billion feet of lumber. There is under consideration a contract for one-half billion feet each on the Yakima and Colville Reservations. Lumber amounting to 400 million feet on the Fort Apache Reservation and 150 million feet on the Klamath Reservation is available if scalers can be found to help get timber out of the forests. In each instance the maximum cut allowable under sustained-yield operation is being permitted.

Last year approximately 600 million feet of timber were cut from Indian reservations. It is expected that this will be materially increased this year.

In addition to the regular funds, \$140,000 have been placed in Arizona, California, and Washington for the employment of lookouts and guards to protect Indian forests. One hundred and thirty towers are now manned.

Indian Service Assists Other Countries

The work of the Indian Service during the past year literally extended to the four corners of the world. For example, the Government of Saudi Arabia learned of some of the small-scale irrigation developments among the Indians of the Southwest and the King personally requested assistance in developing similar facilities among the people of that country. The Palestine Economic Corporation asked the Office of Indian Affairs for recommendations and help in the development of similar work in Palestine.

At the request of the Rosenwald Foundation, studies were made of Indian education in Peru, Ecuador, and Bolivia, and assistance given educational officials in those countries in the development of a program of Indian education.

Active assistance was rendered the Ecuadorian Economic Survey Mission, formed by the Office of Foreign Agricultural Relations of the Department of Agriculture, upon request of the Coordinator of the Office of Inter-American Affairs, to study the possibilities of improving and increasing the production of sheep and wool in Ecuador. Service officials assisted the Haitian Government in developing its rural school program. This service was requested by the Haitian Government and the Department of State.

Other activities included a study of Indian administration in the various Latin American republics, assistance in developing collaboration among the several governments which have large Indian populations, and surveys in South America in behalf of the Coordinator of Inter-American Affairs, in the interests of the popular arts.

Indian CCC Leaves Outstanding Record

The fiscal year 1942 marked the ninth year of conservation work by Indian enrollees of CCC and concluded a unique chapter in the annals of Indian Service. The original objectives of CCC-Indian division were to provide employment and vocational training for Indians who were in need of work. Actual accomplishments far surpassed those initial aims.

Conservation structures to check the destructive erosion of lands now protect the forests, range, and forage cover on Indian reservation lands and adjacent areas. Thousands of miles of truck trails reach into Indian forests and range lands. Telephone lines, fences, and firebreaks aid in the efficient protection and use of forests and ranges. Fences alone, built by Indian enrollees, measure 12,537 miles—more than half the circumference of the earth.

More than 75,000 different Indians had a part in the CCC program. Vocational training was provided in 55 different occupations. Eight

and Indians earned the rating of skilled workmen. Forty thousand were classed as semi-skilled in job performance.

Approximately 6,500 former Indian enrollees are now in the armed

The skills and safety habits acquired through their CCC jobs in truck driving, tractor operation, radio and telephone mechanics, motive repairs, jack-hammer operation, handling of explosives, fighting, and the like, will prove of inestimable value to the nation.

Others are employed in airplane factories, in shipyards, in munition manufacturing plants, on highway construction. Among them are welders, riveters, engineers, tractor operators, metal workers, carpenters, and masons.

Indian Schools Adapt Curricula to War Training

Indian schools of the Indian Service naturally have been affected by war preparations for war and by the program of war training. Many older boys have entered the armed forces of the country and many of the men teachers have accompanied them. In the Indian schools located near war industries, the remaining students have been rapidly absorbed into such employment as soon as they reached an employable age and have had a minimum of skilled training. On the West Coast, employment opportunities in aircraft factories and shipyards have been opened to young women and classes in machine-shop practice and welding for girls have been provided for the Indian Service. This trend toward female employment is being carefully watched and similar classes will be opened in other Indian Service schools as the demand arises. Most of these high schools have operated on a 6-day week, 12-month basis, to speed up training of students and provide for the training of an increased number. Older men have been welcomed in these schools for retraining or brush-up work preparatory to entering the war industries.

The Wingate Vocational High School on the Navajo Reservation has undertaken special pre-enlistment training for young Navajo men to correct their use of English, give them necessary preliminary health examination, and the elements of preliminary military training which will ease their induction into the armed forces and compensate for lack of earlier education. The war is resulting in additional emphasis on the program of native language work for it is through the use of written Navajo particularly that the older non-English-speaking Indians are receiving instruction in war aims and objectives, with regard to civilian activities which contribute to the war effort.

On the reservation Indian schools have taken the leadership in repair and maintenance of automotive equipment, farm machinery, and

other similar activities making their shops available for use by adult Indians in cooperation with the Extension Division and CCC project leaders. School gardens have been greatly increased and school personnel has cooperated closely with the Extension Division in encouraging the increase of Indian community gardens.

The rubber shortage has reduced the use of school buses, and in a number of instances riding horses or horse-drawn vehicles have been substituted. The Education Division's program of breeding Morgan horses initiated several years ago at Pine Ridge, Rosebud, Tongue River, Carson, and Chilocco has laid the foundation for the replacement by horses of much automotive equipment. The success of the program has led to the introduction of horse breeding on other reservations. This activity may contribute directly to the war program in other areas by supplying well-bred horses for military and civilian use outside the Indian Service.

Cooperation with the Department of Agriculture in the development of community size dehydrating plants has resulted in the production of a very useful unit built largely of second-hand material, which has made possible the quick drying of many types of fruits, vegetables, and meats. These experiments have been conducted at Phoenix Indian School and hundreds of tons of this summer's crop of surplus food products have been dried and are available for use in Indian schools in the United States and Alaska. Additional units are being built for use in other areas of the Service. This is only a portent of the potentialities of dehydration not only for the Indian Service, but for commercial production.

Tribal Government in the War Crisis

These war years perforce will hasten the maturing of tribal self-government. With appropriations reduced, with personnel drawn off into military service and war industries, and with the Federal Government concentrating its resources on the prosecution of the war, the Indian tribes will find it expedient and perhaps necessary to make ingenious use of their powers of self-government. Some few tribes may fail for lack of leadership or because of peculiar handicaps, but for the great number it will be a time of challenge and of growing into maturity. Under normal conditions this growth might have been reached through years of hesitant groping. Now, faced by crisis, there is no choice.

The ground is well prepared for this testing. The tribal governments which have been fostered since June 18, 1934, the date of the passage of the Indian Reorganization Act, are survivals of tribal governments which existed even before the founding of the American Republic. Were they the recent creations of a federal government

only granting local home rule to Indian groups there could be expectation of survival for them during the months ahead. the rooting is deep. The powers of self-government possessed Indian tribes are not derived from the Indian Reorganization Act. act is largely a recognition of the inherent powers of self-government, which the tribes have always possessed and is the means of making such tribal government effectively to function.

From the earliest years of the Republic, the Indian tribes have been recognized as distinct and separate political communities, qualified to exercise powers of self-government, not by virtue of any delegation of powers from the Federal Government but rather by reason of their national tribal sovereignty. The public usually thinks of Indians as wards of the Federal Government, which exercises over them individually the kind of power and protection usually exercised by a guardian over a minor. Many people, otherwise familiar with Indian affairs, do not realize that Indian tribes are legal entities, subject to Federal law to the exclusion of State law, and entitled to exercise their inherent rights of self-government so far as is consistent with Federal law. An Indian tribe possesses all powers of a sovereign State except those which have been specifically taken away from it either by treaty or by act of Congress. Tribes are subject to the legislative authority of the United States, that is to the Congress. Tribes are not subject to State laws except where Congressional action has so decreed.

While the Congress and administrative officials have in numerous instances frustrated the exercise of tribal powers, the courts have steadfastly upheld them. And while these powers have been restricted somewhat by treaties and acts of Congress there still remains for the Indian tribes a large area in which the inherent powers of self-government may function. A tribe may determine its own membership, regulate domestic relations, control the distribution of the property of its members in the absence of contrary legislation, administer justice in connection with every offense not specifically made a Federal offense, and exercise many other rights and powers.

It is well to call attention at this time to the relationship of Indian tribes to State and Federal government in view of the considerable attention now being given in this country to problems of colonial administration likely to be encountered after the war. The Indians represent conquered nations but nations whose rights are being protected by the highest courts in the land. However much the Federal Indian Service may suffer for lack of appropriated money or of qualified personnel, Indian tribal government should suffer no loss of effectiveness. On the contrary this should be a time of structural growth against the future.

Tribes Invest Their Money in Land

One certain indication of the growing earnestness with which Indian Tribes are facing the task of providing for the future is to be seen in their willingness to invest their own tribal monies in land. This trend started several years ago and continues at a quickening pace. Among the tribes using their funds for land purchases are the Navajo tribe of New Mexico and Arizona; the Confederated Bands of Utes, Utah; the Round Valley Reservation, California; and Colville Reservation, Washington; the Flathead Indians, Montana; the Omaha Reservation, Nebraska; the Spokane Indians, Washington; the Chippewa of the Consolidated Chippewa jurisdiction in Minnesota; the Warm Springs Reservation in Oregon, and the Cheyenne River Reservation in South Dakota. The Flathead tribe, which receives a sizeable annual revenue from a power site lease, is in the midst of developing a long-term program which contemplates land purchase, the resettlement of landless members, and investment in livestock and farming equipment. A similar opportunity confronts the Blackfeet Tribe in the same State. Here royalties derived from oil deposits in tribal land are being converted into the resources and tools required for an extensive program of tribal and individual rehabilitation.

Lands in Heirship

Absence of an adequate land base is not the only handicap which some tribes face. In the Sioux area of North and South Dakota there is abundant land, but unfortunately a great part of it, in the case of one or two reservations the greater part of it, remains in Indian possession and yet is lost to effective Indian use through inheritance possession; ownership has become divided among so many and so widely scattered heirs that control is lost and the Indian Service is burdened with a costly and unproductive real estate agency. This situation has existed for a number of years. The Indian Service has made little headway in improving the situation though it has been a subject of constant discussion during the past decade. The most encouraging development of these last 10 years is the interest which the Sioux Indians themselves are now taking in the problem. During the fall of 1941 meetings were held with Indians on several of the Sioux reservations, followed by a general conference for the purpose of summarizing observations and recommendations. Indians eagerly participated in these conferences and contributed some of the most searching and constructive thinking. The Cheyenne River Tribe has already taken the lead in formulating a code of land management aimed at establishing procedures for consolidating scattered individual and tribal holdings. It has long been realized that this baffling

em will not be remedied until the Indians concern themselves t. From the beginnings now being made in the Sioux country possible that the first real advance toward the solution of this lemma will be made.

Tribes Maintain Their Own Courts and Police

still another important area of social action Indian tribes are oping the type of autonomous action which is latent in the s residing in them. This is in the field of law and order, do- c relations, and the conduct of members. Maintaining law and among upwards of 350,000 Indians living on 174 reservations ever been a simple task. Offenses committed by Indians against ns on Indian reservations are not usually subject to the juris- n of the State courts. Only 10 major offenses are subject to urisdiction of the Federal courts. Other offenses must be led by the Indians themselves through their own courts. To add e difficulty there has been a serious reduction in law enforcement nnel. The Indian tribes have met the situation seriously and ively. Out of all the Indian tribal courts and Indian enforce- machinery now operating, there have been remarkably few laints of injudicious action or of failure of the tribal machinery. mparative study of the effectiveness of this tribal adjudication courts operating in non-Indian communities would probably inate interestingly the essential law abidingness of the Indian e and the high level of judicious practice. In the allotted where Indians and non-Indians live side by side the enforcement v and order through tribal courts is often more difficult. ie Planning and Development Branch has especially emphasized ecessity of having tribal councils and Indian communities plan , more effective utilization of their social and economic assets. umerous conferences have been held in the field with Indian Service nnel and members of Indian councils relative to the formulation ans for the establishment of planning committees and the develop- of social and economic programs for communities and reserva- . Functioning planning organizations have been established on Warm Springs, Flathead, Fort Belknap, Rosebud and other vations.

Victory for the Walapai Tribe

1 December 8, 1941, the Indians won an important victory in Supreme Court of the United States. A unanimous decision ns the possessory right of the Walapai Indians to lands which have occupied from time immemorial although these lands had

been granted by the Congress of the United States to the Santa Fe Railroad prior to the establishment of the reservation.

In 1923, the Santa Fe Railroad, claiming about half of the lands of the Walapai Reservation under a railway grant act, asked that the reservation be divided into two equal parts, one of which would henceforth be the absolute property of the railroad.

Case Lost in Two Courts

Six years ago, the Department of Justice commenced a suit to establish the continuing Indian right of occupancy to the whole reservation and, its right to such other areas as still might rest under an unextinguished right of occupancy. The case was lost in the United States District Court of Arizona, and again in the United States Circuit Court of Appeals. The Solicitor of the Interior Department, upon invitation of the Department of Justice undertook to make a final effort to have the Supreme Court review and reverse the decision of the lower courts.

The Supreme Court granted the petition for a review of the case by certiorari. The case was argued on November 13 and 14.

The Circuit Court of Appeals had held that Indians in this area are in an inferior legal status to Indians in other areas, because of supposed discriminations under Spanish and Mexican law. This position was vigorously rejected by the Supreme Court, which declared that the rules laid down in earlier opinions guaranteeing respect for aboriginal occupancy of tribes under former Spanish dominion had "been so often and so long repeated as respects land under the prior sovereignty of the various European nations, including Spain, that like other rules governing titles to property they should now be considered no longer open."

Supreme Court Reaffirms Marshall Doctrine

It was argued also that since the land claims of the Walapai Tribe had never been recognized by the Federal Government either in a treaty or in any other formal action, the tribe could not show any rights superior to those of the railroad. In rejecting this contention the Supreme Court reaffirmed the doctrine of Chief Justice Marshall that the Indian tribes are "distinct political communities, having territorial boundaries, within which their authority is exclusive, and having a right to all the lands within those boundaries, which is not only acknowledged, but guaranteed by the United States." Accordingly, the Court said, the fact that a right of occupancy finds no formal recognition is not conclusive.

A third question of general interest considered in the Supreme

Court's opinion, written by Mr. Justice Douglas, was whether forcible removal of Indians from their ancestral homeland terminates their possessory rights in lands which they have occupied from time immemorial. The Supreme Court held that where such removal is not based upon Indian consent, there is no forfeiture of rights. Referring to the military removal of the Walapai Tribe, the Court said:

Their forcible removal in 1874 was not pursuant to any mandate of Congress. It was a high-handed endeavor to wrest from these Indians lands which Congress had never declared forfeited. No forfeiture can be predicated on an unauthorized attempt to effect a forcible settlement on the reservation, unless we are to be insensitive to the high standards for fair dealing in light of which laws dealing with Indian rights have long been read.

The case was remanded to the courts below to secure an accounting to the Walapai with respect to income heretofore derived by the railroad from lands legally subject to Indian occupancy.

Supreme Court Upholds Indians' Fishing Rights

In another significant decision the Supreme Court on March 30, 1942, held that the State of Washington is without power to charge the Yakimas a fee for fishing in their usual and accustomed places.

Sampson Tulee, a member of the Yakima Tribe, was convicted in the Superior Court for Klickitat County, Wash., on a charge of catching salmon without first having obtained a State license. This conviction was upheld by the Supreme Court of the State of Washington.

In 1855, the Yakimas were occupying lands which the United States wished to open up for settlers. Representatives of the Government met with representatives of the Indians and negotiated a treaty under which the Indians ceded a large amount of land.

Article III of this treaty secured to the Indians the exclusive right of taking fish in streams running through or bordering the reservation and also the right to take fish at all usual and accustomed places in common with the citizens of the territory.

Relying upon its powers to conserve game and fish within its borders the State asserted that its right to regulate fishing might be exercised at places not within the boundaries of the reservation. The appellant, on the other hand, claimed that the treaty gave him the right to fish in the "usual and accustomed places" free from State regulations of any kind.

The Supreme Court decision upholds the right of the Yakimas to fish in such areas without having to pay the State license. The decision, however, makes it clear that the State does have a right to regulate the taking of game and fish but holds that the imposition of license fees is not indispensable to the effectiveness of a State conservation program.

Menominees Win Court Award in Swamplands

When the United States, in 1854, under treaty with the Menominee Indians, set aside the present reservation, the Menominees were left with lands which 4 years before had been granted to the State of Wisconsin as "swamplands."

The Court of Claims during the past year decided that the Menominees were entitled to these lands and handed down an opinion opening the way to the recovery of the lands from the State of Wisconsin. If this opinion is not upset by the Supreme Court, it will be the final solution of a problem which has vexed the Indians and Indian administration for many years. These swamplands are scattered over the reservation—small islands of land, within the reservation, the title to which was in dispute. With the purchase of these the entire reservation and its timber will belong to the Menominee Tribe.

This reservation has one of the finest stands of hemlock and spruce woods in the entire Lake States. It has not been cut over and covers most of the area. The Menominees operate a lumber mill on the timber of the reservation on a sustained yield basis.

A Vital Opinion on the Fishing Rights of Alaskan Natives

The fishing industry is the largest and most important source of income and of employment for the natives of Alaska.

Originally the natives of the Territory had access to many fishing areas. Under Indian custom certain families or tribes were recognized as owners of these areas. From time immemorial, they possessed hereditary exclusive rights to these sites. The white men came to Alaska and established fishing traps and salmon canneries, and began to encroach upon and to establish fishing sites where the Indians had formerly been fishing.

After the Supreme Court handed down the *Walapai* decision, the Solicitor of the Interior was asked to give an opinion as to whether the rights of the Indians of Alaska did not have aboriginal fishing rights according to the principles set forth by the Court in the *Walapai* case, were being violated. The Solicitor's opinion of February 1942, was in the affirmative.

After citing numerous court decisions upholding the possessory rights of Indians in lands and water where such rights have been extinguished by any treaty, statute, or administrative action, the Solicitor concluded that "Available evidence indicates that the possessory rights traditionally asserted by Alaskan natives in

clusive rights, under which the right to exclude others from a given area is an integral part of the right in itself. In this situation the Interior Department would have no authority to open up to public fishing any areas subject to such possessory rights, any more than it could open to the public a private cannery, whether on land or afloat."

It becomes necessary, under the opinion of the Solicitor, for the natives to establish the fact of continued occupancy.

National Indian Institute Formally Created

The report of the Department for 1941 announced the ratification by the United States Senate on May 26, 1941, of the international convention creating the Inter-American Indian Institute. This institute was formally created on March 25, 1942. On that date the representatives of the adhering nations met in Mexico City, organized the Governing Board, and selected Mexico City as the permanent site of the Institute. Commissioner Collier was selected president of the board. This organization is the official agency for the development of collaboration among the American nations on matters affecting the more than 30,000,000 Indians who live in the Western Hemisphere.

Article X of the Convention stipulates that each ratifying nation shall establish a National Indian Institute to serve as an affiliate of the Inter-American organization. Pursuant to the provisions of this article, President Roosevelt, by Executive order, on November 1, 1941, established an Institute to serve the United States.

The National Indian Institute will perform within the United States functions comparable to those which the Inter-American Indian Institute performs among the American nations.

The National Indian Institute utilizes the administrative facilities of the Office of Indian Affairs and receives guidance from a Policy Board composed of the Commissioner of Indian Affairs, two or more members appointed by the Secretary of the Interior, one of whom must be an Indian, and one representative each to be designated by the Secretary of State, the Secretary of Agriculture, the Smithsonian Institution, the Librarian of Congress, the National Research Council, the Social Science Research Council and the American Council of Learned Societies.

The Department of Interior representatives on the Board are Assistant Secretary Oscar L. Chapman, who will serve as chairman, Mr. Rene d'Harnoncourt, General Manager of the Indian Arts and Crafts Board, Mr. D'Arcy McNickle, who is the Indian member of the Board, and Mr. John Collier, United States Commissioner of Indian Affairs, who serves as the director of the Institute.

Activities of the Institute During the Last Year

The National Indian Institute last year sent two field representatives to Latin America to investigate the Indian policies of the various countries, to describe the work of the several divisions of the governments dealing with the Indian problems, and to evaluate the effectiveness of that work. Reports on the Indian policies of Venezuela, Ecuador, Peru, Brazil, and Guatemala were prepared and the data were collected for an evaluation of these policies. These reports have had wide distribution among United States officials interested in Latin American collaboration.

The war has served to focus the attention of the American people upon the necessity of improving our relations with the peoples of other American republics. In this process we are discovering that in many of these countries the Indians constitute the bulk of the population. We are finding out, too, that if we are to get rubber from Brazil, tin from Bolivia, and other strategic minerals from the Central and South American countries we shall be dependent almost entirely upon Indians for labor and transportation. Thirty million Indians in the Western Hemisphere are a significant percentage of the total population, indicating that only in our provincial North American thinking has the Indian and his culture ceased to live and function. With the increased emphasis upon Pan-Americanism we shall hear much more of the Indian in the post-war era.

For many years the record of the United States in its handling of its Indian minority served only to create fear among the countries south of the Rio Grande with large Indian groups. Fortunately, however, the new Indian program of the United States, increasingly effective over the last dozen years, has exhibited nearly all that the Indians of the southern countries could hope for. This new program has emphasized the changed attitude on the part of the United States toward a minority of a different culture and blood, and constitutes a reassurance to our neighbors. It has provided one of the needed foundations for Hemisphere cooperation.

Indian Arts and Crafts

The impact of the war economy on the production and merchandising of Indian arts and crafts has created many new problems that threaten the gains made in this field under the guidance of the Indian Arts and Crafts Board. General regulations governing production and commerce in the emergency must be formulated mainly to fit

industrialized production and therefore often create excessive hardship among Indian craftsmen. The WPB regulation prohibiting the use of wool in the manufacture of drapes and floor coverings, for example, would have barred thousands of Navajo weavers from earning a cash income. Since these Indian weavers are not in a position to change their technique or to use other raw materials, and since the total wool consumption by Indian weavers is relatively small, their case was presented by the Board to the appropriate authorities, and an exemption was secured for textiles that are both hand-woven and hand-spun. A similar problem was presented by the restriction on the use of silver for purposes nonessential to the conduct of the war.

The intervention of the Board has been and is still needed in the establishment of price ceilings and the posting of price lists based on price levels as of certain dates in the past. Since many Indian products are not made in accordance with accepted standards, but vary from piece to piece, arrangements must be made to allow for the evaluation of those products for which no precedent has been established.

One of the tasks of the Board in wartime is to keep up crafts production among those groups who are unable actually to participate in work that is directly connected with the war. This is particularly important, since many of the jobs now available to Indian labor, such as construction work on factories located near reservations, are only of a temporary nature.

The present decrease in tourist trade, that is due to the current transportation difficulties, has been felt in many regional outlets for Indian arts and crafts. To overcome these difficulties, the Board is organizing new temporary retail outlets in areas not affected by travel limitations. The Board has also continued its long-range activities of initiating and enlarging Indian production and merchandising organizations.

The Northern Plains Indian Arts and Crafts Association, located on the Blackfeet Reservation at Browning, Mont., has for the first time, during the past summer, offered products from several other nearby reservations, such as Fort Belknap, Rocky Boy, and Flathead. On each of these reservations, production groups have been or are now being organized to supply the Northern Plains Arts and Crafts Association with merchandise.

Surveys to be used for the organization of production and merchandising units have been made among the Hopi, the Maricopa, and the Yavapai.

Research Projects

Several research projects have recently been organized which should prove of far-reaching value to Indian administration.

The first of these is a study of Indian diet, a study intended to determine the effects on food habits, of custom, tribal project, economic factors, and education. The study is to be comparative of tribes of different environment and tradition. Pilot studies have been completed on the Papago, Hopi, and Navajo reservations for comparative purposes in two Spanish-American communities in New Mexico. The Indian Service and the University of California are jointly undertaking this study, field direction under the oversight of Dr. Robert Redfield, being provided by Dr. Fred H. Steward, assistant professor of anthropology at the university. The American Indian Institute has signified its wish to extend the study to Latin America.

Of still deeper significance is a study of personality development of Indian children begun tentatively on the Papago Reservation in February and now broadened into a well-organized project on several reservations: Papago, Navajo, Hopi, Zuni, Zia, and Pine Ridge. The research seeks to describe how Indian children grow up, how they are molded by the world of family, of tribal customs, of white society, and government personnel, and how they take their places as adults. The data gathered by this inquiry will be coordinated by a special staff under the chairmanship of Dr. W. Lloyd Warner, professor of sociology and anthropology at the University of California and will be available at the same time for administrative consultation by the Indian Service. This project also has been accepted as an international one by the inter-American Indian Institute.

The study of the relationships of Navajo medicine and modern medicine, mentioned in last year's report, has been continued during the year and will extend throughout the fiscal year 1941. The study was first begun by Dr. Alexander Leighton and Dr. I. D. Leighton of Johns-Hopkins. Dr. Dorothea Leighton has been retained by the Indian Service and will continue the study. She already is giving Indian Service physicians an insight into the means of utilizing the therapeutic values inherent in the songs, ceremonies, and healing herbs, sweat baths, and other aspects of the native medicine and religion.

Dr. Alexander Leighton was called to active duty by the War Relocation Authority but fortunately the Office was able to obtain his detail to the Relocation Center on the Colorado River Reservation to conduct the needed research in connection with the administration of the Center where many social problems confront the administrative staff.

le this particular research does not deal directly with Indians, findings should be of inestimable value in future dealings with groups where many of the same problems are to be found. It is even probable that this study will prove helpful in coping with some of the problems of colonial administration which will be encountered in the post-war reconstruction the world over.

Medical Research

Indian Service continued during the year its tuberculosis case work, although the loss of personnel handicapped these efforts somewhat. A general survey revealed 419 fewer new cases than the year of 1937, indicating at least a slow but definite progress in the abatement of this scourge among the Indians.

Treatment of trachoma by sulfanilamide has continued to produce encouraging results. Although close laboratory check has been discontinued, most patients receiving treatment are hospitalized in order to insure supervision. Sixty to eighty percent of all cases treated reported arrested with remarkable improvement in vision. Many patients are now entirely free of the disease.

Publication of Handbook of Federal Indian Law

One of the outstanding contributions to Indian administration was made during the past year with the publication of the Handbook of Federal Indian Law by Felix S. Cohen, Assistant Solicitor of the Department of the Interior.

Based on a compilation of some 4,000 statutes and treaties and judicial decisions and administrative rulings, the handbook traces the development of Federal Indian law, Indian administration, and Indian rights from their origin to present time. The legal basis of Federal Government's treaty relations with Indians is fully explained and there is a detailed analysis of the extended relationships of tribal self-government, Federal powers and reserve State powers over Indians. Mr. Cohen's work represents the most comprehensive ever made of laws relating to Indians in the United States.

Indian Service Personnel Hard Hit by War

Indian Service personnel administration has experienced the worst perhaps of all times. Scores of employees have left to join the armed forces. Many others have transferred to agencies more closely connected with the war.

The medical service has been especially hard hit. Twenty physicians and six part-time physicians have been called to duty with the armed forces. Replacements are difficult to obtain. An additional 15 physicians hold reserve commissions and can be called at any time. Some have also left the Service to enter private practice. There is now a 70-percent coverage of the Indian Service by full-time physicians. This situation is alarming and it is imperative to provide Indians with even the most essential medical care.

Nurses likewise have been called to the armed forces. There are 200 vacant positions among the Indian Service hospital and clinic nurses. The situation is particularly acute in Alaska where transportation of newly appointed nurses often delayed for months. To help meet this critical situation the Indian Health Service is broadening and intensifying its training program for Indians. Classes for hospital aides at the Kiowa hospital in Oklahoma now enroll 40 students instead of 20. Graduation occurs after 6 months of training instead of the usual 9. Sixty men are being trained as hospital orderlies and interpreters at various centers, following a regular schedule of work. Hundreds of Indians and employees are being given first aid and home nursing courses.

Restrictions in local transportation due to rubber shortages limits the effectiveness of those employees who remain. Ingenious methods of increasing the scope and effectiveness of the employees are appearing on every hand. Extension agents and field workers are riding horses. Regional supervision has been materially reduced.

There has been a continual recasting of the functions of the Indian Service. Essential war activities must go on, such as food production, production of strategic minerals, protection and utilization of forests, production and protection, and cooperation with the War Department in securing gunnery and bombing ranges and airports. Other activities not immediately war connected will be maintained to the extent possible with limited personnel. Every effort will be made to continue to provide medical care and to maintain school facilities for Indian children, and to operate other functions essential to the welfare of the Indians.

Civilian Conservation Corps

CONRAD L. WIRTH, Representative, Department of the Interior,
Advisory Council, Civilian Conservation Corps

DURING the fiscal year ending June 30, 1942, six bureaus and as of the Department of the Interior supervised the conservation development of the Nation's natural resources through the operation of an average of 309 Civilian Conservation Corps camps 71 CCC-Indian units in the continental United States and an average of 8 camps in Hawaii, Alaska, and the Virgin Islands. Projects undertaken by the CCC included the protection and improvement of Federal Grazing lands and Indian reservations; protection and propagation of wildlife; development of recreational facilities in National, State, and local parks; cooperation in the development of irrigation and hydroelectric power programs; broad preservation of the public domain; and rehabilitation of the human natural resources of the islands and territorial possessions.

General Land Office Camps

The General Land Office operated three Civilian Conservation Corps camps in Oregon, and one in Wyoming, and carried on a program in the Territory of Alaska. The camps in Oregon were assigned to the conservation, protection, and development of the 2,500,000 acres of Oregon and California revested lands, an important reservoir of commercial timber being put on a sustained-yield basis to provide a productive forest in perpetuity. The declaration of war, however, caused concentration on activities directly connected with the waging of the war, with the resultant curtailment of forest conservation work. Despite this diversion of strength from conservation projects and the reduction of personnel, however, the camps continued their forest protection and utilization work. Since the Oregon and California forests are an important source of timber for military purposes, every effort must be made to protect it and make it available for present use. The Wyoming camp, until it was closed in May, continued its work in suppressing the outcrop coal fires which were threatening with

destruction an inestimable amount of the Nation's coal reserves in the vicinity of Little Thunder Basin, Wyo. These deposits are a fuel reserve of untold value.

During the year 11 coal fires were attacked, 4 of which were completely suppressed. Although all of the fire suppression projects have not been completed, all except one are in good enough shape to withstand weathering and further combustion for some time due to lack of attention.

Civilian Conservation Corps activities on the 325,000,000 acres of public domain in Alaska were transferred to the General Land Office on April 1, 1940. Since the impact of the war prevented completion of the planned number of whites, the enrollment was limited to native Alaskan Indians and Eskimos. The program was directed mainly for the benefit of the native peoples. Working in cooperation with the Office of Indian Affairs, the General Land Office coordinated its enrollment, work projects, and camp locations with the development program of the Indian Office. Wherever CCC camps were established in villages in dire need of assistance and where projects would benefit the entire community. About 50 villages were benefited during the year.

One of the greatest problems in Alaska is transportation. Personnel maintained and staked winter sled trails and new winter landing fields to make mail, freight, and passenger travel possible with a minimum disruption in service.

Office of Indian Affairs

Both the work projects and training activities of CCC in the Office of Indian Affairs were modified during the past fiscal year. The whole program would be made to contribute directly to the preparation of the war.

At the invitation of the War Department, three projects were taken on military reservations to relieve troops for training. These would otherwise have been required to do this work. Typical of the work rendered was one project where Indian enrollees, using CCC equipment, cleared and leveled the drill fields, removed brush and filled in gulleys, cleared away debris left by the gas contractors, built camouflage structures, constructed a small range, and a small arms practice range.

During the year, approximately 2,000 Indian enrollees completed themselves through national defense training courses for employment in war industries. Over 8,000 Indians have been trained in forest fire fighting and a similar number have completed the Red Cross standard or advanced first-aid training. The Indian first-aid instructors in the CCC-Indian division

operated by the Indian CCC are located at strategic places in forest or range areas, thus providing trained crews ready for instant call in emergency service. Other CCC-Indian division activities have centered around the Indian communities, thereby permitting close coordination between CCC and the local programs for civilian defense.

Results of the work of Indian CCC which are helping to win the war are becoming increasingly evident. The enlarged carrying capacity of ranges, the saving and storage of water for livestock and for irrigation, the conservation of ranges and forests, are enabling the Indian reservations to yield increased quantities of needed food and wood products.

Bureau of Reclamation

During the fiscal year 1942 there was a reduction in the number of CCC camps assigned to the Bureau of Reclamation from 43 camps in operation on July 1, 1941, to 7 camps in operation on June 30, 1942. The termination of the camps assigned to the Bureau was effected in company with a general reduction of all camps within the Civilian Conservation Corps.

In general, the year's activities were a continuation of previously initiated programs, accentuated to reflect the country's war program. The development of irrigation facilities and the rehabilitation of existing irrigation facilities were stressed for early completion.

National Park Service

The fiscal year 1942 saw a marked change in the Civilian Conservation Corps program conducted by the National Park Service. The development of park and recreational areas gave way to the urgent business of developing military reservations with the many facilities needed for proper training of the armed forces that had to be made available quickly. In July 1941, 262 continental CCC camps were operating under the technical supervision of the National Park Service, 20 assigned to areas under the jurisdiction of the Army and Navy, 83 to national parks and monuments, 21 to recreational demonstration areas, 113 to State parks and 25 to county and metropolitan areas. Because of reduced enrollments numerous reductions in over-all CCC operations were made until at the close of the year only 89 camps were being operated, with 50 assigned to military and naval areas, 20 to national parks and monuments, 10 to recreational demonstration areas and 9 to State parks.

With the declaration of war, the National Park Service terminated CCC projects which were not directly related to the war effort. By the end of the year all work was progressing in the interest of the full

war program. The on-the-job training that the enrollees had in the development of public lands for park and recreational purposes equipped them well for the work required at the many larger reservations. This enabled the armed services to devote more attention to the important job of providing military training.

The realigned CCC programs for the protection of Federal areas were planned for defense against direct enemy attack, and other war hazards to forests, waters, strategic structures and physical improvements. Major emphasis was placed upon personnel and organization for protection of important natural resources and strategic facilities against incendiary fires and high explosives of personnel against war gases. But consideration was also given to the protection of forest and grass lands which represented the watersheds essential to agriculture, power, and domestic water.

Civilian Conservation Corps activities in the Territory of Alaska continued with an authorized strength of 675 enrollees. Until December 8, general conservation projects were prosecuted. Thereafter CCC engaged in emergency work directed by the Army. The time work has been reported to be of great importance to the military authorities.

The CCC in the Virgin Islands completed an important well-being program started in the previous year. Also much general conservation and development work was continued. After the declaration of war CCC labor and resources were used on defense projects requested by the military authorities.

Grazing Service

The facilities of the Civilian Conservation Corps were utilized by the Grazing Service in the construction and maintenance of range improvement projects on the public domain during the past year. The work was equitably distributed among the 58 Federal grazing districts located in the 10 Western States of Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, and Wyoming. These districts embrace a total of 142,000 acres of range land which provides forage for the seasonal grazing of 11,000,000 head of livestock.

At the beginning of the fiscal year 63 camps were assigned to the Grazing Service. The number was gradually diminished, however, until only 10 were in operation at the end of the fiscal year.

In the last half of the year much of the regular range improvement work was deferred in order to concentrate on projects which would contribute more directly to the war objectives. Minor roads were built to mines and mills engaged in the development and production of strategic minerals. Roads were also built to aid in the construction of military installations.

operation of bombing areas, gunnery ranges and emergency landing fields. And, in one instance, many miles of road were constructed parallel to an international boundary as an aid to border patrol. The Grazing Service reproduction plants, manned largely by CCC enrollees, produced many maps and photographs for the Army and various defense agencies.

On December 9, 1941, less than 48 hours after Pearl Harbor, the Grazing Service, working in conjunction with the Office of Civilian Defense of the State of Utah and the Army, established a detection service for reporting the approach of aeroplanes. Ten Civilian Conservation Corps camps are equipped with radios and 24-hour service has been maintained. Any unusual movement of planes is immediately reported by radio to our station and the information relayed to the Office of Civilian Defense and the Army.

The CCC camps of the Grazing Service supplied the main source of power for our program of range and forest fire protection during the year. Extensive training in fire suppression was given to selected enrollees in order that well-trained and efficient crews would be ready in any emergency.

Fish and Wildlife Service

The amount of wildlife conservation and developmental work accomplished this year by the CCC on refuge areas was greatly diminished due to the gradual decrease of the number of camps under jurisdiction of this Service from 36 to 12. Existing camps have been or are being converted as rapidly as possible from work on the refuge areas to more important essential war work in order to furnish the greatest possible aid to our war effort. During the year this Service had 4 camps directly engaged in the development and improvement of military areas, and arrangements are being completed to transfer the remaining 8 camps which are scheduled to this Service either to military areas or on projects necessary for the conservation of our natural resources most important to the war program.

Division of Territories and Island Possessions

GUY J. SWOPE, Director

THE impact of war on the offshore areas coming under the supervision of this Division has overshadowed all other events. The war brought about changes in the lives of the people in the continental United States, but it can truthfully be said that every aspect of life has been affected to a much greater extent in all our offshore areas. In a report such as this it has been customary to present considerable statistical information as to progress made during the preceding year; but it does not seem advisable to attempt to do so in any detail in this report primarily for military reasons, and also due to the fact that statistics in a war economy, particularly such as in effect in our offshore areas, are distorted to such an extent that they are almost meaningless.

The general pattern during the year up to December 7, in all these areas, was almost the same. Feverish defense preparations and the expenditure of large amounts of Federal funds had brought about increased employment. On the other hand, the cost of living was going up rapidly and the shipping problem was causing widespread adjustments in the internal economy of the offshore areas. The controls which the United States Government placed over exports and the supply of strategic material and equipment presented additional problems. Other factors which caused intricate and difficult situations, notably in the Philippines, were the orders establishing control over assets belonging to aliens.

These conditions were bringing home to the people the imminence of war and, to a much greater extent than prevailed generally on the continent, the people and local officials visualized the problems which would bring to the civil governments and the civilian populations. Preparations for civilian defense were under way in all areas for it was realized where the brunt of opening attacks would be likely to fall.

Attacks on Hawaii and the Philippines were almost simultaneous; these were soon followed by hostilities in Alaska. With these

attacks the people of the offshore areas settled down in the grim business of war.

The people of these areas reacted in a manner which was a source of pride and satisfaction to the government. Whatever sins of omission and commission may have been in respect to the inhabitants of areas over which the American flag was less than 50 years ago, the fairness and justice of basic policy at a time of real emergency, bore abundant fruit. All joined in the common defense of a system of government, the advantages of which were more appreciated by residents of insular areas than they were, in many cases, by residents of the continental areas. For generations had never known any other system of government and had come to take their rights and privileges as a matter of course.

A brief résumé of conditions in each area follows:

The Territory of Alaska

Actual hostilities came to Alaska in June 1942, when the United States Naval Base at Dutch Harbor was bombed and this was followed shortly by the occupation of the three western-most islands, Agattu, and Kiska. Even before this attack, the Territory had been declared a combat zone. These attacks brought about the continuation and expansion of a program which has been in operation for 2 years, a program which has affected every aspect of life in Alaska, and seemed certain to bring about even more far-reaching changes.

Just what part Alaska is playing in the war cannot be reported at this time, but eventually the record will form an important chapter in the history of the Territory.

The routine affairs of the Territory and the activities of the Federal agencies which function in the Territory were carried on as well as could be expected under abnormal conditions. The activities of the territorial government are in excellent shape. The Federal agencies which operate in the Territory do so largely on their own funds which relieves the Territory from what would otherwise be a heavy burden. Cooperation between representatives of the Federal Government and the territorial officials has been excellent. One Federal activity, the Civilian Conservation Corps, carried on its functions on the last day of the fiscal year. The work done by the organization in its 9 years of operation in constructing landing fields in remote areas and the building of docks, roads, etc., is proving of immense value in the defense program. Much work was done during the year in the development and protection of wildlife resources which is one of the major assets of the Territory. Both the Territory and Federal agencies concerned give special

tion to the problems of the native population and the means of adjusting them to a rapidly changing social and economic order. An extensive program of education and public health designed to fit the peculiar interests of the natives is followed.

The general public in the United States has little conception of the present importance of Alaska industries to the economy of the United States and the latent possibilities of their development of these resources. Products of the mines, and of the fish, fur, and lumber industries are of tremendous value in a wartime economy. Alaskan spruce is of importance in the manufacture of airplanes and there are extensive forests suitable for the manufacture of newsprint. It may reasonably be expected that one result of the war will be the development of aviation both for passenger and freight traffic beyond anything formerly even dreamed of. More than any other area under the American flag, such a development would be of importance to Alaska and the possibilities of aviation and other means of communication which are being improved as a result of the military program as a means of developing the latent resources of the Territory are almost unlimited.

The Alaska Railroad

The Alaska Railroad operated 500.8 miles of line the year around, furnishing passenger and freight service between Seward and Fairbanks, and on branch lines serving the Matanuska and Nenana coal fields.

The passenger train schedule in effect during the summer of 1941 provided for three round trips weekly between Seward and Fairbanks, one weekly between Fairbanks and McKinley Park, and one every 2 weeks between Fairbanks and Nenana. No regular schedule was maintained from September until January, when a weekly trip between Anchorage and Fairbanks was made. Beginning April 24, three round trips weekly were made between Seward and Anchorage.

Both passenger traffic and freight tonnage showed substantial increases over last year. A new freight house was built at Anchorage, and a new concrete depot and general office building is under construction there. A dormitory and mess house was completed at Eska Coal Mine.

River boat service was maintained during the season of river navigation from Nenana to Tanana, Ruby, Holy Cross, and Marshall.

Territory of Hawaii

Immediately following the attack on Pearl Harbor on December 7, 1941, the Territory was transformed instantaneously into the center

of an active combat zone. The Governor of the Territory proclaimed a state of martial law and suspended the writ of habeas corpus.

Under an act passed a few months before known as the "Defense Act," steps had been taken prior to the attack by the Japanese authorities to prepare for war. The Office of Civilian Defense was sufficiently well organized to swing into immediate action with 17 divisions and 12 subdivisions, employing a total of 2,529 employees augmented by some 14,000 volunteers. From funds provided by the Department of the Interior for civilian defense in Hawaii assistance was rendered and is being continued to four agencies not directly under OCD—the office of the military, the public health service, public and private hospitals, and county and fire departments.

The more important divisions under the OCD, all of which are functioning continually, include the bomb disposal division; communications; gas defense; mortuary and burial division; plans and maps; women's division; demolition, rescue and repairs; transportation; air-raid wardens, with nearly 5,500 volunteer members; evacuation division, emergency medical division, including supervision of blood plasma banks, first-aid stations and emergency ambulance service, the civilian emergency hospital and nursing school; registration division; and bureau of classification.

Despite the dislocation in all phases of life and economy engendered by the state of war, the financial condition of the Territory continues to be excellent, it was indicated by the general fund receipts for the fiscal year which totaled \$22,065,468.54 as compared with estimates as prorated for the fiscal year of \$19,707,155.22, an increase of \$2,358,313.33. From a review of a further prorated estimate for the next fiscal year it is felt that an unexpected surplus of the general fund at the close of the present year ending June 30, 1943, will approximate \$4,000,000 in the light of emergency conditions.

Cash on hand and in banks of all funds deemed to be in the Territory of Hawaii amounted on June 30 to \$24,529,428.50, an increase of \$4,923,150.51 over the \$19,606,277.99 on hand and in banks on June 30, 1941.

Collections of the Territorial Harbor Board in the fiscal year ending June 30 were \$891,336.51, a decrease of \$66,591.53 from the previous year, due to the current war conditions since February 7, 1941.

This decrease was brought about by reason of the fact that shipping between the Territory and overseas as well as inter-island shipping was operated after December 7, 1941, by agents of the Federal Government which paid no charges. Negotiations are being made by which it is hoped that the territorial government

required to maintain such harbor facilities may be reimbursed by the Federal Government.

The Governor of the Territory points with pride to the fact that Federal internal revenue collections for the fiscal year amounted to \$32,067,927, an increase of more than 100 percent. As compared to the situation in other offshore areas, the Territory may well be proud of this record.

Production and shipment of canned pineapple and pineapple juice continued throughout the year in nearly normal quantities, shipments in the 12 months ended May 21, 1941, having been 11,056,491 cases of pineapple and 11,284,938 cases of pineapple juice. The Federal Government purchased substantial quantities of these and announced that its requirements for the coming year would be 34 percent of the canned pineapple pack and 21 percent of the juice pack for Army, Navy and lease-lend shipments.

Shipments of raw sugar, Hawaii's other principal agricultural product, are expected to total 850,000 tons for the calendar year 1942.

In brief, under martial law and under the broad provisions of the Hawaii Defense Act, the work of virtually every Territorial department has been turned in some degree to furthering the war effort of the United States. War and the Nation's program has affected in some way the life of every citizen and every person resident in the Territory of Hawaii.

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Wages likewise rose. Increased employment, the operation of the Fair Labor Standards Act, and heightened union activity, all combined to ordain sorely needed adjustments. An additional factor, the Insular Minimum Wage Law, is expected to make a similar and important contribution during the coming year; it became operative at too recent a date to make itself felt at this writing.

Prospects for the immediate future, however, are distinctly less promising, for as the year drew to a close the employment situation took a sudden turn for the worse. The cumulative effects of the shipping problem became increasingly evident as shortages of raw materials, consumption commodities and gasoline dictated curtailed operations in private business. Widespread dismissals of employees ensued, and to aggravate matters, they came at a time when defense projects were nearing completion.

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Organized labor registered a general advance during the year. New unions sprang up and became affiliated with existing organizations as discrimination against unionized employees tailed off under the National Labor Relations Act. A companion measure "To Protect Workmen and Employees Against Prejudicial Discrimination of Their Employers, etc.," was passed by the Insular Legislature and approved toward the close of the fiscal year.

However, the upward trend of wages can hardly be considered to have been adequate in the face of the proportionally greater increase in the cost of living that was registered during the year. Taking the year 1938-39 as a basis, it appears that indexes of wage rates were 130 for industrial workers, 136 for commercial employees, and 128 for office workers, whereas price indexes of the main constituents of the Puerto Rican labor diet were 191 for rice, 310 for codfish, 181 for beans, and 157 for fats; the index for all foods was 172.

As is to be expected in a period characterized by rapidly expanding commercial activity, increasing employment, and a rising cost of living, there were frequent industrial disputes during the year. The Department of Labor aided in the conciliation of 71 strikes and controversies involving 26,740 workers. In this task the Department enjoyed the cooperation of the United States Conciliation Service in the person of Commissioner Charles Goldsmith, whose extremely valuable assistance in preventing and adjusting strikes served to promote industrial peace, especially in those operations affecting the program of national defense.

A wealth of social and labor legislation was passed and approved during the year with a view to promoting the welfare of insular society in general and of labor in particular.

The financial progress achieved during the fiscal year amounted to \$10,650,411.82, as against \$2,960,415.82 for 1940-41. The general fund showed a balance of \$20,526,788.18, compared to \$6,447,843.39 for the previous year.

Total tax collections from the alcoholic beverage industry and from narcotics reached a new high at the close of the fiscal year under report. Total collections reverting to the general fund amounted to \$18,044,306.23, an increase of \$10,639,184.10, or 143.67 percent above the previous year's collections, which amounted to \$7,405,122.13.

The tax collections on Puerto Rican rum shipped to the United States constitute the largest amount ever collected on the island from a single source of government income. The unprecedented increase for the present year is accounted for by the rapid growth of the local rum industry, and the favorable market conditions prevailing in the United States.

Income-tax collections also reached a new high during the period under review. Total collections amounted to \$7,635,382.93 as com-

pared to \$2,843,433.42 for the previous year, the increase amounting to \$4,791,949.51.

During the year the Treasurer of Puerto Rico revised the revenue estimates for the general fund increasing them from \$20,450,000 to \$35,200,000, but the revenue collections actually totaled \$37,578,862.49.

Outstanding bond obligations of The People of Puerto Rico on July 1, 1942, amounted to \$23,700,000, as against \$26,975,000 on July 1, 1941. During the year bonds were redeemed in the sum of \$3,275,000.

The Virgin Islands

By reason of their strategic location not only as the most eastern outpost of the United States but also as the keystone of the arch protecting the Caribbean Sea approaches to the vital Panama Canal, it is most natural that the major concern of the Virgin Islands during the past year has been that of defense, both military and civilian.

Such has been the scope of the defense plans and their fulfillment that perhaps in no other place under the American flag has the normal economic and social structure of community life been so radically affected. Months before our entry into the war, the administration recognized the gravity of the geographical position of the Virgin Islands. Steps were initiated immediately toward a concentrated program of civilian defense. There was a prompt organizing of Councils of Defense by both island municipalities which were quick to move into active intensive programs. When war did come, the Virgin Islands defense program was well under way.

In this connection it is gratifying to note the comments of James M. Landis, Director of the United States Office of Civilian Defense, on examination of a report of civilian defense activities in the islands:

From these small dots of American soil in one of the world's most critical defense zones, we get a splendid example of civilian alertness to common danger and timely cooperation to meet it with adequate measures. We must put into practice in the Nation much of what these islands, which have an area of only 133 square miles, have already done.

On the islands of St. Thomas and St. Croix there have been extensive military preparations. What has been done in the past and what the effects have been may not properly be reviewed in detail. It can be said, however, that the entire population of the islands has responded in an excellent manner and that they have demonstrated their patriotism and loyalty to the United States.

The war has emphasized the difference in economy between the islands of St. Thomas and St. Croix. The resources of St. Thomas are commercial and the increases in trade stimulated by war activities raised the estimated municipal revenues of St. Thomas

nearly \$600,000, thus making it possible for the municipality of St. Thomas and St. John, for the first time since the purchase of the islands by the United States in 1917, to be financed without Federal deficit appropriation.

The economy of the municipality of St. Croix is agricultural and has been adversely affected during the last 5 years by repeated drought. During the year, the Municipal Council of St. Croix with the approval of the present administration repealed the iniquitous export tax of a ton on sugar, which tax was among the burdens that destroyed the private sugar industries of St. Croix and added to the losses of the Virgin Islands Co. which was established by the government to provide employment and a market for small farmers. Existing nowhere else under the United States flag, the repeal of this tax had been urged for many years. About the time of the tax repeal, the present administration succeeded in having Congress apply to the Virgin Islands the Sugar Act of 1937. Heretofore St. Croix had been the only sugar-producing area of the United States that did not share the benefit payments provided by that act, in spite of the fact that St. Croix's sugar was required to pay the processing tax from which such benefit payments were made to all other areas.

Employment, which is the first known measure of economic health, was at its peak on the island of St. Thomas where extensive military preparations gave remunerative employment to every employable male. In St. Croix, after months of much unemployment, the War Relocation Projects Administration and the National Youth Administration gave employment to nearly every eligible male. By the end of July, however, the WPA employment quota was severely reduced and the National Youth Administration and the Civilian Conservation Corps were abandoned. The serious effects of this, as well as the gradual reduction of employment in the municipality of St. Thomas by reason of the tapering off of military construction, will be increasingly felt in the new fiscal year. Although the employment situation was most satisfactory, it cannot be said that the economic health of the Virgin Islands is sound, despite its fair superficial appearance, because real economic health depends upon real wage and stability of employment.

In the municipality of St. Croix the new abattoir built by the Federal Government was operated as a WPA demonstration and training project. Many cattle, sheep, and hogs were slaughtered for export to St. Thomas and Puerto Rico. In St. Thomas the modern cold storage market built by the Federal Government was substantially completed. Facilities have been provided for the marketing and cold storage of all locally produced foodstuffs, fish, poultry, meat, vegetables, eggs, and dairy products. The processing, selling, and cold storing of meats have been given particular consideration.

er to serve as a companion project to the abattoir in St. Croix. It is expected that the operation of this market together with the operation of the abattoir in St. Croix will be within the framework of the Virgin Islands Co. These two units when organized for operation will be an important factor in meeting the demand for foodstuffs created by defense activities and the serious shipping situation.

The finances of the municipal government in St. Thomas were in excellent condition. For the first time since 1917, the municipality of St. Thomas and St. John was financed without a Federal deficit appropriation. The Federal deficit appropriation of \$15,000, which was made by Congress, was not used. In St. Croix the fiscal affairs of the municipality, after being at a very low ebb for many years, took a slightly more favorable turn. For the first time in 4 years it was not necessary to borrow money to meet an operating deficit over and above the Federal deficit appropriation. However, an enthusiastic reception of this golden era must be tempered by the poor potentialities of the forthcoming fiscal year.

The Philippine Islands

The Philippines are the only outlying possession of the United States under the jurisdiction of this Department that has fallen into the hands of the enemy.

In view of the growing tension in the Far East, President Roosevelt, on July 26, 1941, issued an order calling all of the organized military forces of the Government of the Commonwealth of the Philippines into the service of the armed forces of the United States for the period of the emergency.

During the preceding months, with the aid and cooperation of the American authorities, the President of the Philippines had used the emergency powers granted him by the National Assembly to prepare and carry forward the work for national and civilian defense. This foresight proved invaluable when the Philippines were attacked.

National elections were held in November 1941, for President, Vice President, Senators and Representatives to form the new bicameral Philippine Congress that was to replace the National Assembly on December 30. President Quezon and Vice President Osmena were reelected.

The outbreak of war with Japan came 3 weeks after the sixth anniversary of the establishment of the Commonwealth Government and completely changed the Philippine picture. At the celebration of that anniversary (November 15, 1941) President Quezon renewed the pledge of loyalty of the government and of the people of the Philippines to the United States and urged cooperation "in her gigantic

effort to save democracy and banish totalitarianism from the face of the earth." On December 3, 1941, President Quezon declared—

There is no territory under the American flag, including continental United States, where the people are more united behind President Roosevelt than we are here in the Philippines. . . . The flag of the United States will be defended by American and Filipino soldiers until the last round of ammunition has been fired. The whole Filipino people welcome the opportunity of testing their loyalty to America through blood and fire.

On December 8 (Manila time) the Japanese attacked the Philippines. A week later the National Assembly met and adopted a resolution declaring a state of total war emergency. President Quezon was authorized to enforce emergency regulations and he immediately commandeered food, fuel, building materials, and other prime necessities. He simplified government machinery by merging the nine cabinet positions into four key posts. When it became evident late in December that Manila could not be held against the advancing Japanese forces, it was declared an open city (December 26), and the United States High Commissioner with certain members of his staff and the President of the Philippines and cabinet members transferred their offices to Corregidor. There the second inauguration of President Quezon and Vice President Osmena took place on December 30. In his inaugural address the President reaffirmed his loyalty to the United States and pledged the Filipinos to "stand by America and fight with her until victory is won." Throughout the 4-month Luzon campaign—on Bataan which fell into the hands of the enemy on April 9 and on Corregidor which fell on May 6—Filipino soldiers heroically fought alongside Americans in defense of their country until disease and exhaustion forced them to surrender. As expressed by the President of the United States, their gallant struggle against the Japanese aggressors "elicited the profound admiration of every American."

United States High Commissioner Francis B. Sayre and certain members of his staff were transferred to Australia later in February and from there returned to Washington. Upon his arrival on March 23, Mr. Sayre submitted his resignation to the President, and it was later accepted effective as of June 30.

The President of the Philippines and members of his cabinet were evacuated to the southern part of the Philippine Archipelago late in February and subsequently transferred to Australia. Later, accepting the invitation of President Roosevelt, they arrived in Washington on May 13, and on May 14 formally established a government in exile. On many occasions since then, the President of the Philippines has reaffirmed the gratitude and loyalty of the Filipinos, stating "We stood and still stand with the United States in life and in death." He stated that his government's immediate job was to take care of

the thousands of Filipinos stranded here and abroad and to prepare for the day when his government is reestablished in Manila.

War conditions in the Philippines necessitated prompt action by our Congress. In December several measures were enacted for the purpose of dealing with the changed situation. The First War Powers Act, 1941 (Public 354, 77th Cong., approved December 18) conferred on the President of the United States broad powers to control foreign funds and enemy property. The powers of the High Commissioner were greatly extended by the delegation to him on December 19 of such powers relating to alien-owned property in the Philippines. These included authority to take over for safekeeping securities, gold bullion, silver currency and other reserves and to take steps necessary to prevent their falling into the hands of the enemy. The work of collecting tons of metal and paper in Manila and transporting them to Corregidor, where they were counted and inventoried, was performed with the aid of the Army, Navy and other government officials under most trying conditions. The paper currency and treasury certificates were destroyed; the bullion worth about \$1,500,000 and valuable securities were loaded on a submarine at Corregidor and transferred in mid-ocean to another naval vessel, which delivered them to the United States Treasury Department. Thus every ounce of gold and every security accepted by the office of the High Commissioner for safekeeping reached the United States safely.

The Sugar Act of 1937 was amended by extending for 3 years (or until June 30, 1945), payments to the Commonwealth government of taxes collected thereunder, and an additional sum of \$10,000,000 was appropriated by the Congress for public relief and civilian defense in the islands for the fiscal year 1942.

Granting in part a petition of the Philippine National Assembly, the Congress suspended until December 31, 1942, the collection of the export taxes on Philippine products and the progressive reduction of quotas prescribed in the Tydings-McDuffie Act as amended. The assembly had requested such suspension from January 1, 1941, until July 3, 1946, or during the present emergency.

The total overseas trade of the Philippines during the first 9 months of 1941 (the last period for which figures are available) amounted to \$245,532,635. Included in this figure is the value of gold and silver exports (\$38,542,914), nearly all of which came to the United States. Trade with the United States and Territories amounted to \$203,526,409, or approximately 83 percent of the islands' total trade. The Philippines purchased from the United States merchandise valued at \$90,113,868, thus occupying seventh place as a customer of the United States, as compared with ninth place in 1940. In this respect the islands were outranked by the United Kingdom, Canada, Union of South Africa, Egypt, Mexico, and Brazil, in the order named. Philip-

pine shipments to the United States, including gold and silver, amounted to \$113,412,541, or nearly 85 percent of the total exports.

The above figures reveal that, despite prevailing war conditions, **had** trade continued uninterrupted and at the same ratio for the full 12 months, the total external trade of the Philippines for the year 1941 would have exceeded that of the record year of 1929 by \$12,469,335, or nearly 4 percent. It should be noted, however, that there would have been only a slight gain of \$1,647,973 in imports. The increase of \$10,821,362 in exports would have been due entirely to the increased production of gold and silver, which rose from \$3,300,393 in 1929 to an estimated figure of \$51,390,552 in 1941.

Lack of shipping, excessive freight and insurance rates, tightening of export control and the dislocation of trade due to war conditions in Europe continued during the first 5 months of the period under review to hamper the normal interchange of merchandise. During the 3 months, July-September 1941, Philippine exports to Asia and Oceania, which in part had compensated for loss of trade with Europe, showed a decline of almost 22 percent compared with the corresponding period of 1940. The explanation for this is found in the fact that, due to the freezing of her assets, Japan's purchases for the same period had fallen from \$2,312,985 for the same quarter in 1940 to \$878,388 in 1941. On the other hand, the increased demand for war materials in the United States more than offset this loss, so that in September 1941, the American market absorbed more than 93 percent of all the products exported by the Philippines. Had it been possible to ship a substantial tonnage of the sugar held in Philippine ports because of lack of shipping space, the United States would have had a virtual monopoly of the Philippine export trade during the last part of 1941.

At the same time, however, the outlook for Philippine economy was not promising, especially as represented by the sugar industry, upon which the government depends for more than 40 percent of its revenue. The iron ore industry also had lost its best, and practically only, customer—Japan. Late in October it was reported that, beginning November 1, the United States Federal Loan Agency would begin the purchase of specified quantities of certain strategic war materials such as chrome and manganese ores and form stock-piles in case they could not be shipped at once. The course of events, however, made inoperative all measures taken to ward off an apparently impending economic crisis in the Philippines.

During the year ended June 30, 1942, payments in total amount of \$8,710,030.35 were made by this Division from funds of the Philippine government. Of this amount \$2,086,292.16 was for supplies purchased in the United States and shipped to the Philippines, \$4,109,000 was for the redemption of Philippine bonds, \$1,998,097.50 was for interest on the Philippine public debt, and the remaining \$516,640.69 was for

salaries and expenses of Philippine personnel in the United States, pensions to retired Philippine employees, and other miscellaneous items. The interest payment on outstanding bonds of the Philippine government will continue to be met from funds of the Commonwealth of the Philippines on deposit in this country. No payment of principal is due until 1946.

As of June 30, 1942, the Philippine Commonwealth had funds in a total amount of \$212,036,221.67 on deposit in the United States, \$210,047,729.54 being with the Treasurer of the United States and \$1,988,492.13 with two national banks. These funds consisted of \$134,169,734 currency reserves, \$67,900,933.78 general funds, \$9,950,000 trust funds and \$15,553.89 unexpended balance of funds set aside for the purchase of bonds.

Included in the amount of general funds mentioned is an item of approximately \$29,000,000 being the proceeds of collections of the excise tax on coconut oil, which is earmarked for the specific purposes stated in the Philippine Economic Readjustment Act of August 7, 1939. It is estimated that additional collections to be reported will raise this amount to approximately \$35,000,000.

The United States Treasury Department is also holding for the Commonwealth silver pesos with a face value equivalent to \$315,000, and gold bullion valued at \$1,500,000.

Equatorial Islands

The administration of Howland, Baker, Jarvis, Canton, and Enderbury Islands, situated in the mid-Pacific Ocean, approximately on the Equator, continued through the year without any untoward incident until the outbreak of hostilities on December 7, 1941. A detailed report on these activities is omitted on account of the war situation.

Puerto Rico Reconstruction Administration

GUY J. SWOPE, Administrator¹

DURING the past year, the impact of war in the Caribbean brought swift readjustment of several Puerto Rico Reconstruction Administration operations to meet emergency conditions. Local production of increased food supplies to take the place of imports from the States reduced by shipping difficulties became a major objective. Facilities made available by the long-range program for social betterment in Puerto Rico were placed at the disposal of the armed forces. For example, numerous prints of required portions of PRRA's aerial survey map of the island were supplied to the Army and Navy, and the Puerto Rico Cement Corporation plant which was constructed with PRRA funds has been allocating two-thirds of its daily production of high quality cement to Army and Navy projects and a substantial portion of the rest of its production is consumed by other defense projects. In addition, a butyl alcohol and acetone plant is delivering its complete production to industries having either direct or indirect war contracts.

Resettlers on PRRA lands have been moved to other locations in order that farms and homes they had occupied might be transferred to meet Army and Navy requirements. First aid emergency rooms have been provided adequately in the various urban housing projects and the fullest possible cooperation has been extended to the civilian defense authorities.

Under the expanded food production program, 175 acres of the land in the Eleanor Roosevelt Development not occupied by houses and streets has been planted in rice, beans, corn, and peas; short-term crops are intensively cultivated under PRRA supervision at the Cas-

¹ By Executive Order No. 8888 dated September 3, 1941, Guy J. Swope, Director of the Division of Territories and Island Possessions, was appointed Administrator to serve without additional compensation, vice Admiral William D. Leahy, who resigned as Administrator in December 1940 when appointed Ambassador to France. Miles H. Fairbank, Assistant Administrator, who had been interim Acting Administrator, resigned and was succeeded December 1, 1941, as Assistant Administrator in active charge of work in the field by Guillermo Esteves.

er and American Suppliers projects, and in the Lafayette District. Other, it is anticipated that at least 2,000 additional acres will be devoted to food production during the next fiscal year as the result of construction of about 600 small rural houses authorized by the President on previously undeveloped PRRA lands.

Funds Available

Contrasted with an aggregate of \$69,904,000 in relief funds made available to the PRRA during the previous 6 years of its existence, the Puerto Rico Reconstruction Administration has had only \$1,428,- available for expenditure during the 1942 fiscal year. Of this, \$5,338 represented unobligated balances as of June 30, 1941, from previous appropriations, was reappropriated by the Second Deficiency Act of 1941 to complete the purposes and objects stipulated in section 1 of the Emergency Relief Appropriation Act, fiscal year 1941; and \$253,553 was approved by the President for expenditure during the fiscal year from the Puerto Rico Revolving Fund (49 Stat. 1135) for the following projects:

housing management, replacement and repairs.....	\$186, 000
Lafayette project.....	95, 903
Stanley Farm, operation and maintenance.....	50, 000
grants to cooperatives.....	350, 000
Eleanor Roosevelt Development.....	450, 000
Administration.....	121, 650
Total.....	1, 253, 553

A summary of the year's principal accomplishments follows:

Housing Management

The PRRA manages, operates, and maintains 5 low-cost urban housing projects containing 1,051 family dwelling units, 2,589 homesteads in its 7 rural resettlement areas, and 3,129 homesteads scattered throughout the island. Most of these houses are of concrete, and are termite and hurricane-proof. In addition there are 5,272 small parcels of land which are leased for cultivation to laborers at nominal rentals. The Eleanor Roosevelt urban development near San Juan, containing about 500 dwelling units constructed under previous programs, was qualified as a defense housing project; construction of 161 additional units, financed by \$450,000 allocated out of the revolving fund was authorized, and 51 of these have been practically completed; the remaining 110 will be finished in the next few months. Occupancy as of June 30, 1942, for the urban projects was 100 percent; for the 7 rural resettlement areas 98.25 percent, and for the scattered rural

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units, 95.17 percent. Total rental collections amounted to \$1,112,390 with obligations for management, repairs, and maintenance of \$1,112,390, leaving a gross return of approximately \$112,390. With an estimated reserve of \$40,000 for future replacement and repair work, the net return of about \$72,390 as compared with \$60,000 for the preceding year.

Rural Electrification

To complete the program of previous years during which the PRRA expended approximately 9½ million dollars for hydroelectric projects, transmission and distribution lines, \$43,318 of the obligated balances authorized for use during the fiscal year was expended in supplies and machinery for the Dos Bocas hydroelectric project. The Insular Government has provided the necessary funds for the small amount of work required to bring this important project to completion and use.

Forestry

Having no further funds for continued development and protection of approximately 22,000 acres of land acquired under previous reforestation programs, the PRRA has practically completed negotiations for transfer of about 5,000 acres to the Forest Service of the United States Department of Agriculture, and the remaining 17,000 acres to the people of Puerto Rico for reforestation purposes.

Soil Conservation

To continue progress in soil conservation practices with a view to increased production of foodstuffs, the PRRA had available for the fiscal year only \$12,000 reappropriated from previously obligated balances. However, research, field, and demonstration work on insular, Federal, and private lands was continued.

Cattle Tick Eradication

The PRRA's systematic cattle-dipping program of previous years laid the foundation for providing the island with wholesome meat. To insure insular continuance of the program, the Legislature of Puerto Rico appropriated \$150,000, and the PRRA transferred the Insular Department of Agriculture and Commerce all the equipment formerly used in the work.

Loans to Cooperatives

With \$350,000 authorized for expenditure from the revolving fund, the PRRA continued the supervision, organization, and financing

eratives. Particular attention was devoted to the vegetable
eratives organized primarily with a view to exporting fresh
ables to the New York winter market. To save tomatoes, etc.,
h could not be shipped or sold to Army and Navy bases or in the
l markets, small loans were made for the purchase of cans, and
addition of the canned product to the island's needed food supply.
ortage of cargo space for their sugar has added to the problems
ne cooperative Los Canos and Lafayette sugar mills, and because
riority restrictions, they have also had difficulties in obtaining
pment needed for increased operating efficiency. However, they
e done as well as could be expected, and the increased supply of
yl alcohol and acetone by the Lafayette enterprise to industries
aged in the war program is a source of real gratification.

n insular act regulating the sugar industry of Puerto Rico was
roved May 12, 1942, effective 90 days thereafter. This new law
ces the manufacture, processing, and refining of sugar in Puerto
o a public service enterprise, subject to the control of the Insular
olic Service Commission as to rates, profits, zone of operations,

It is too early to speculate as to the possible effect of this
slation on the two sugar mill cooperatives financed by the PRRA.
The Puerto Rico Rug Cooperative, which obtained an additional
n of \$10,000 in the fall of 1941, and which from October last to the
t of June this year had shipped and sold nearly 114,000 rag and
ng rugs for about \$55,500, will now have to reduce operations and
fine itself to the local market until shipping conditions are im-
oved.

An additional loan of \$75,000 was made to the Puerto Rico Cotton
owers' Marketing Cooperative in July 1941 to finance its rapidly
anding operations. For the first 5 months of the season members
the southern district of the island had already delivered to the gin
ore than twice the amount of the previous year's production, and
is expected that the northern district also will surpass all previous
ords in cotton weight and quality. The cooperative has a con-
ct with the Commodity Credit Corporation for special cotton
quired in the war program.

The Sociedad Agrícola de Puerto Rico, organized in 1939 princi-
lly to purchase farm supplies (particularly fertilizer), for members
io now number about 1,700, obtained an additional PRRA loan
\$190,000 in February 1942, partly to finance acquisition of a
emical fertilizer mixing plant, partly for necessary operating capital.

Rural Rehabilitation

No Federal funds were made available for the broad program of
ral rehabilitation which formerly had been one of the most impor-

tant PRRA activities. However, through \$81,200 appropriated to the PRRA by the insular legislature, operation of PRRA'S Central Service Farms was resumed and substantial rehabilitation work in the rural resettlement projects was continued. With emphasis on increased production of food crops on approximately 12,000 acres already in cultivation by PRRA resettlers, 500 additional acres of seedbeds were planted in bananas, plantains, yams, corn, rice, beans and various other vegetables. In a coordinated program with the Work Projects Administration, the PRRA furnished technical direction, land, work animals, agricultural implements, warehouse and other facilities, and the Work Projects Administration furnished labor, fertilizers, insecticides, etc., for planting 300 acres of seedbeds in grains and tubers to be turned over to the WPA for its planting and school-lunch programs. Like activities, including repairs and upkeep of roads, waterworks and buildings in PRRA resettlement areas, as well as operation of Central Service Farms and the furnishing of technical advice and help to resettlers in their production of food crops so badly needed in the island, will be financed during the fiscal year 1943 by \$50,000 appropriated by the insular legislature and \$82,900 approved for expenditure from the revolving fund

Conclusion

The tremendous amount of unemployment which principally motivated the establishment of the PRRA does not appear in as bold outline as it did 7 years ago, but the problem of a dense and ever-increasing population forced to wrest a livelihood, mainly by agriculture, from exceedingly limited resources, still remains. Recent financing of the PRRA and the \$1,150,380 authorized for expenditure out of the revolving fund for the fiscal year 1943 is barely sufficient temporarily to protect investments of the Government valued at approximately \$20,000,000 produced by previous PRRA programs, and to conserve some of the social and economic progress which would be completely lost if the program were entirely terminated. Unless the present Revolving Fund Act is amended by legislation (S. 1358) which has long been pending in the Senate so that receipts from projects financed out of the revolving fund (as present PRRA projects are financed), shall go back into the revolving fund, that fund will soon be exhausted. Then either the PRRA will have to be liquidated, or continuation of its most necessary activities either by the PRRA or by some other agency qualified to do the work, will have to be financed by direct Federal appropriations. It is also to be borne in mind that when the war is over, or sooner if Army and Navy projects now under way are completed, the unemployment problem somewhat alleviated by those activities, will again become

acute. Inevitably then by reason of the insufficiency of the island's peculiar economy, consideration again will have to be given as to whether mere palliative relief should be afforded, or whether in the light of the PRRA's experience, relief or other Federal expenditures should not be devoted to projects with long range reconstruction possibilities. The contributions which the PRRA has made to the development of the natural and human resources of the island, and particularly the development of more progressive leadership among those who have received its help and training, should not be allowed to go to waste.

Division of Investigations

DALE B. WHITESIDE, Director

THE Division during the fiscal year 1942 rendered substantial services in meeting requirements of our Nation at war.

Before and since Pearl Harbor, large areas of public lands in the United States and Alaska were withdrawn by Executive order, subject to valid existing rights, from all forms of appropriation under the public land laws and reserved for the use of the War or Navy Departments as bombing or gunnery ranges, or for other military or naval purposes. Such use required the clearing of title to the withdrawn areas which necessitated the checking of thousands of mining claim records and the examination of several million acres of land. In order to serve notice of the proceedings, a search was made for approximately 10,000 claimants. Numerous hearings were held in contested cases and thousands of invalid mining claims were canceled as a result of the investigations.

Services performed for the Bureau of Reclamation included the appraisal of mineral lands and the examination of mining claims within the Shasta, Keswick, and Friant Reservoirs of the Central Valley project in California, the Davis Dam project on the Colorado River, and the Colorado Big Thompson reclamation project in Colorado. Similar services were rendered in completing the remaining mineral cases affecting the Grand Coulee project in the State of Washington.

A recheck appraisal of a considerable area of privately owned lands to be purchased in connection with the Cascade Reservoir site, Idaho, was also made at the request of the Bureau of Reclamation.

The Division cooperated with the National Park Service in appraising lands to be added to parks and in investigating mining claims on park and monument lands. The work involved in clearing title to lands within the Joshua Tree National Monument in California proved to be extensive as approximately 8,750 mining claims were found of record. Adverse proceedings have been directed against 3,900 of these claims and 105 applications for hearing are pending.

number of investigations were made for the Office of Indian Affairs, including a survey to determine the grazing privilege rights of white stockmen on certain lands within the so-called Ute Extension Area within Utah Grazing District No. 8. The lands in question had been purchased by the Office of Indian Affairs in furtherance of a program to make additional areas available to Indians for grazing purposes.

A substantial part of the work of the Division continued to be the investigation of grazing lease applications and renewals, in furtherance of the program to protect and conserve the public domain. During the fiscal year 2,899 reports were submitted relating to investigations of grazing lease applications.

The following violations were investigated on which reports were submitted during the fiscal year ended June 30, 1942, for criminal prosecution:

Embezzlement.....	4
Submitting false claims against the Government.....	3
Perjury.....	4
Making false acknowledgments in certificates.....	1
Timber trespass.....	3
Grazing trespass.....	2
Forgery.....	1
Cutting witness trees at section corners.....	2
Theft of Government property.....	2
Oil and gas frauds.....	2

Nine of these violators were indicted during the fiscal year and 10 defendants, some of whom were indicted prior to July 1, 1941, were convicted.

Reorganization

By departmental order dated January 17, 1942, the Division of Investigations was reorganized. A Branch of Field Examination was established in the General Land Office to make inspections, surveys, and other field examinations. The order also established a staff of field representatives attached directly to the Office of the Secretary for the purpose of making such over-all studies and performing such field examining work for the Office of the Secretary and its various bureaus as the Secretary shall direct.

Summary

The combined units, on June 30, 1942, consisted of 115 employees, of whom 23 were on duty at Washington, D. C., and 92 in the four regional offices located at San Francisco, Calif.; Billings, Mont.; Salt Lake City, Utah; and Albuquerque, N. Mex.

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The following is a résumé of the work accomplished during the fiscal year:

Type of case	Pending July 1, 1941	Received	Closed	Pending June 30, 1942
Appraisals (including mining claims).....	580	20, 057	5, 590	15, 057
Application to purchase timber.....	1	1	2	0
Color of title.....	0	1	1	0
Contest.....	0	1	0	1
Court cases, miscellaneous civil.....	4	8	8	4
Court cases, criminal.....	15	19	24	10
Desert entries.....	854	57	859	52
Five-acre tracts.....	0	8	1	7
Grazing applications.....	28	0	28	0
Grazing leases.....	1, 252	2, 492	2, 809	845
Homesteads.....	468	479	671	276
Indian allotments.....	0	3	0	3
Irrigation projects.....	2	1	3	0
Isolated tracts.....	128	443	352	219
Land classification.....	2	2	3	1
Land exchanges.....	123	572	296	399
Leases, Alaska.....	39	9	43	5
Mineral entries.....	129	132	198	63
Miscellaneous.....	54	399	363	90
Official conduct.....	4	0	1	3
Oil and gas leases.....	0	11	0	11
Oil shale.....	363	0	0	363
Oil placer claims.....	120	91	211	0
Permits.....	11	2	4	9
Personnel.....	19	60	72	7
Qualification of abstractor.....	1	1	2	0
Rights-of-way.....	3	3	2	4
Selections.....	38	32	56	14
Stock driveways.....	13	31	27	17
Swamp lands.....	1	4	4	1
Timber cases.....	352	255	289	318
Timber and stone.....	0	15	6	9
Town sites.....	0	1	0	1
Trespass, coal.....	120	166	166	120
Trespass, fire.....	0	1	1	0
Trespass, gravel.....	2	4	6	0
Trespass, grazing.....	95	9	101	3
Trespass, signboard.....	73	51	124	0
Trespass, timber.....	360	198	305	253
Unlawful enclosures.....	12	9	9	12
Unlawful occupancy.....	5	1	5	1
Total.....	5, 271	25, 629	12, 722	18, 178

Division of Personnel Supervision and Management

MRS. J. ATWOOD MAULDING, Director

THE Division of Personnel Supervision and Management has stepped into the pace set by the emergency to meet the heavy demands for the recruitment of employees created by new war activities, heavy losses by personnel transfers, decentralization of bureaus, and the replacement of men leaving for military service. Nearly 5,500 separations in the Department have been directly attributable to the war, including approximately 1,500 military furloughs.

Many positions have been filled by promotion from within the service, in accordance with the established policy, and those vacated by employees going to the armed services are, of course, filled provisionally for the period of absence. During the year the bureaus in Washington requested eligibles for 2,460 positions, and single requests for as many as 50 or more coal mine inspectors, explosives investigators, geologists, engineers, and nurses were not uncommon. Over 200 engineering aides were appointed in response to an open order from the Geological Survey. These figures do not include the great number of positions filled in the field through the offices of the district civil-service managers.

On January 1, last, the Civil Service Commission inaugurated a direct recruiting system for certain types of qualifications, and the Department has cooperated in this recruitment program. The situation with regard to stenographers and machine operators has been particularly acute, and a large number of these were secured through the direct recruitment process. There has been daily liaison with the Civil Service Commission and recently the Commission has assigned a special representative to handle our requests. There has also been close cooperation with representatives of the Commission in the negotiation of war service transfers, both to and from the Department.

Nearly 17,000 applications for employment have been rated in the Employment Section, and more than 1,000 applicants interviewed,

not including those interviewed in regard to the forthcoming centralization of the Fish and Wildlife, National Park, and Services. Of employees unable to transfer with these bureaus have been placed in other positions, and 115 persons have been recruited for the transfer.

In October 1941, the Civil Service Commission delegated to the Department the authority to approve all promotions and establish status for our own employees. In order to regulate these the Division set up and distributed to the bureaus a complete set of qualifications standards for various types of positions.

In accordance with the terms of the Ramspeck Act, there was established a Departmental Board of Review on Efficiency including one member elected by the employees. Only three appeals were received by the Board. The Department feels rather proud of this record since it indicates considerate attention on the part of rating and reviewing officers and a well functioning grievance machinery. Effective March 31, last, the Civil Service Commission prescribed a revised efficiency rating system. This was inaugurated in the Department with a course in procedures and techniques conducted for 300 officers who are responsible for rating and reviewing the work of employees. The interest shown was commendable.

An effort has been made to stimulate training of various types within the Department, especially as a method of meeting the existing shortage of available experienced personnel. The Stenographic Training Center has continued with increased attendance, but because of the mounting shortage of stenographers, the program of the Center has been curtailed. Its principal objective now is to make newly appointed stenographers acquainted as expeditiously as possible with the Interior Department and its style and form of correspondence, make-up and procedure. The short program does not provide opportunity for increasing skills in short hand and typing. An effort is made, by means of diagnostic tests, to isolate performance faults and to prescribe remedial drills.

The volume of paper work in connection with enlarged war effort and increased personnel turn-over, as well as the loss of a number of the Division's own trained persons, have made unusual demands on the Division. The volume has also been increased by the operation of the automatic promotion law, involving the processing of a large number each quarter. To meet the situation there was installed in the Appointments Section a "processing line" type of organization for speedy transit of personnel actions for signature. Conforming to the departmental policy, classification, accuracy, and complete action are now checked in one continuous procedure without a change of routing and resulting delay. During the past year, 39,675 personnel actions have been handled.

The amendment to the Retirement law on January 24, 1942, extended the benefits to practically every regular Government employee. This very desirable legislation has greatly increased the number of records maintained in the Central Office of the Department, and a large number of inquiries have been handled in recent months. During the year there have been 188 retirements—65 for age, 65 for disability, and 58 voluntary retirements before reaching the retirement age.

A comprehensive Personnel Manual bringing together all existing orders and instructions relating to personnel management in the Department was issued in December 1941. The War Service Regulations and new streamlined procedures adopted by the Civil Service Commission have made material modifications necessary, but we consider the manual a valuable aid, especially to the field officers operating at long distance. The Personnel Bulletin formerly issued semi-monthly is now issued quarterly in line with the desire to conserve labor and paper.

An Employee Handbook explaining the objectives of the Department and the regulations, rights, and privileges of employees has been issued, primarily for the benefit of new recruits, and other steps have been taken to assist new employees in making a satisfactory personal adjustment.

Office of the Solicitor

NATHAN R. MARGOLD, Solicitor ¹

WITH the mobilization of the Nation's vast resources on a war-time basis there devolved upon the Office of the Solicitor, the bureau counsel, and field attorneys, a correspondingly heavy burden of complex, controversial, and unique legal questions. The necessity for developing and making immediately available all of the Nation's resources, without delay to the war program, within the framework of the law, with due regard for individual rights and with a minimum of interference with long-established conservation policies and programs, created many complex legal problems and presented many legal obstacles requiring resourceful, expeditious counsel.

Shortly after the start of hostilities with Japan, it became important to determine what measures would be necessary not only to protect American and Philippine currency and securities in the hands of United States citizens and nationals but also to prevent the use of such currency and securities which might be in or which might fall into the hands of the enemy or enemy agents here and abroad. After intensive study of the United States and Philippine laws involved, especially with respect to Philippine credits in the United States, and following conferences with the representatives of the Treasury Department and of the Commonwealth of the Philippines, measures were devised to accomplish the desired objectives and these measures were successfully carried into effect by the appropriate civil and military authorities. Similarly, the same subject has been studied with respect to currency and securities in other areas, as a result of which instructions have been issued by the Treasury Department providing adequate safeguards and machinery for the registration, custody and, if necessary, the destruction of securities and currency in the event of invasion of such areas.

One of the important laws enacted by the Congress during the year directly affecting the Department was the Federal Explosives Act of

¹ Mr. Margold terminated his service as Solicitor on July 9, 1942, to become an Associate Judge of the Municipal Court for the District of Columbia. Felix S. Cohen served as Acting Solicitor until August 26, when Warner W. Gardner was inducted into office as Solicitor.

September 26, 1941. This is a revision of the 1917 wartime explosives act and was drafted by the Solicitor's Office during the preceding fiscal year. It provides the necessary authority and machinery for the exercise of Federal licensing and control of the manufacture, distribution, storage, use and possession of explosives in time of war or national emergency and is designed to prevent the misuse of explosives by restricting their use and possession to reliable, experienced and loyal persons and their proper concerns. Regulations and licensing procedures implementing the provisions of the act were devised and prepared by attorneys of the Solicitor's Office, and promulgated with their assistance. The decision of the commanding general of the Pacific coast area to evacuate all persons of Japanese descent from within certain limits of the coastal zone to relocate them on Government land removed from possible enemy attack zones resulted in a series of agreements between the War Relocation Authority and the Department of the Interior. Thousands of acres of the public domain were required for this purpose and both the Bureau of Reclamation and Indian lands have been made available to the War Relocation Authority for the construction of housing facilities, the establishment of self-governing communities under Federal supervision and for farming and industrial purposes. Agreements have been negotiated and methods devised whereby the Bureau of Reclamation will supply these wholly unique projects with water and electric power for domestic and commercial purposes; it also will construct irrigation works and provide the necessary facilities and equipment. Cooperative agreements between the agencies affected, and with the Indians, provide for the utilization of Indian lands without extinguishment of the Indian title to such land or the transfer of title to any other grantee. Not only will the Indian owners receive money rental, but also any improvements made upon the land will accrue to their benefit. At least 30,000 evacuees will be relocated on the Klamath, Minidoka, and Shoshone sites, on lands of the Bureau of Reclamation; at least 20,000 on the Colorado River Indian Reservation and an additional 10,000 on the Gila River Indian Reservation. With the rapid development of the war program and the tremendous expansion of the armed forces it became necessary to make available to the Army, Navy, and Marine Corps millions of acres of public land for immediate use as bombing and gunnery ranges, antiaircraft ranges, training and recreation areas, and combat bases, and for other military purposes. Lands already withdrawn and dedicated to a particular use were also made available for military purposes by the Solicitor's Office, Bureau of Reclamation, National Park Service and Fish and Wildlife Service. The orderly, legal, and expeditious disposition of the lands so required presented a variety of novel legal problems. Many apparent obstacles had to be overcome and prac-

tical methods devised—consistent with existing law and the emergency presented.

An important decision concerning the validity of 174 mining claims situated in the area set aside for the use of the War Department as the Muroc Bombing and Gunnery Range, California, was rendered, thereby expediting the availability of the area for military use.

Greatly increased demands upon the Bureau of Mines by the Navy Department for helium gas necessitated the consideration of many intricate legal problems in passing upon the validity of title to easements, rights-of-way and plant sites, and in the preparation of contracts for the acquisition of such lands. A recent appropriation of 4 million dollars, to enable the Bureau of Mines to expand its program to meet the war requirements for helium will, necessarily, result in a marked increase in the legal work in connection therewith.

Rights asserted by private individuals under applications filed pursuant to the sodium provisions of the mineral leasing act to salt deposits in the Death Valley National Monument, California, needed for Federal use in connection with the production of magnesium, and private rights sought to be created by locating mining claims under the United States mining laws for Government-owned sand and gravel in Nevada, needed in the construction of Federal defense plants and housing, were held to be without force and effect.

Yucca, a plant found on the public domain and needed in the prosecution of the war as a substitute for certain strategic or critical materials formerly imported from abroad, was made available for appropriate disposition under authority vested in the Secretary of the Interior by Executive Order No. 9180, of June 5, 1942, issued pursuant to the President's war powers.

Hundreds of legislative matters were presented, vitally affecting the prosecution of the war. Legislation pertaining to the sudden development of the Nation's mineral resources, the rapid expansion of industrial operations and the resultant demand for increased power facilities in the Pacific Northwest; problems in connection with the use of public lands by the Army, Navy, and Marine Corps, especially by the air arms of the services; questions affecting an important source of food supply, the commercial salmon fisheries of Alaska and the Pacific Northwest, and many others, required extensive legal consideration.

A substantial portion of the legal work performed during the fiscal year affecting the Division of Territories and Island Possessions concerned matters directly or indirectly connected with the prosecution of the war. Examples of such matters are: Proposed legislation to provide protection for persons and property in the Territories and possessions against bombing attacks; authorizing the planting of guayule for the production of a domestic rubber supply; authorizing expenditures for evacuating dependents of civilian employees in the

territories and possessions; to permit censorship of communications and between the Territories and possessions; to provide benefits for injury, disability, death, or detention of civilians; questions concerning the filing of income-tax returns and the payment of the tax for persons in the Territories and possessions affected by the war; extension to officers in the Territories of emergency powers with respect to the making and modification of contracts; contracts, leases, and other questions regarding relief and civilian defense in the Territories and possessions; questions regarding shipping rates and fire insurance on shipments to the Territories and possessions; proposed legislation establishing a military code for Alaska; question regarding construction of a military highway to Alaska; orders for the extension of toll charges on shipments over the Richardson Highway for war projects; proposed legislation for the employment of natives on war projects in Hawaii; questions concerning the appointment of nonresident police officers in Hawaii to provide protection for vital facilities; questions concerning the payment of expenses of the Hawaiian home guard; questions as to civil jurisdiction in the naval base at San Juan; questions regarding the sugar quota and the suspension of quotas under the sugar act; Executive order certifying Puerto Rico as a distressed emergency area; questions regarding applicability of Selective Service Act in the Virgin Islands; Executive order transferring property in the Virgin Islands to the Navy Department; contract between the War Department and The Virgin Islands Co. for constructing distribution facilities supplying power in connection with Benedict Field, St. Croix, Virgin Islands.

The most important patent case arose during the fiscal year covering the use of new and useful means of extinguishing magnesium incendiary bombs by the application of feldspar. Manufacture and sale of the extinguisher is permitted under regulations which were drafted in order to insure availability of the product at low cost, honestly priced, and which prevent, insofar as possible, monopolistic practices.

During the fiscal year the office was required to pass upon many involved legal problems and to devise methods for the expeditious acquisition of Indian lands, resources and facilities necessary or desirable in the furtherance of the war program, including the production of strategic minerals, the marketing of commercial timber, increased grain and other food production, including forage for livestock on Indian lands, tribal or allotted, and acquisition by the military forces—Army, Navy and Air—of needed areas of Indian lands. A number of legal matters affecting the prosecution of the war were presented in connection with the activities of the Grazing Service, of which the following are examples: analyzing the means of providing recreational areas for civilian and armed war forces;

analyzing legal aspects of access-road problems, and facilitating drawals for bombing, aerial gunnery or chemical warfare; facilitating transfer of Grazing Service equipment needed by armed forces or for other direct war work.

The number of items presented to the Counsel at Large-Territory of Alaska was 781, many of which directly relate to prosecution of the war.

Legal questions arising in the Bureau of Reclamation during fiscal year 1942 were largely concentrated on activities relating to prosecution of the war. Contracts were drafted and negotiated for supplying power from the Boulder Canyon project and other reclamation projects to vital war industries. Legal arrangements were made for furnishing water for war industries, for military camps and training centers. Land acquisitions required in the construction of war-producing projects were expedited. Authority under the War Relocation Act was utilized to expedite construction of power producing projects such as Central Valley and Colorado-Big Thompson. Requests of the War Department and other war agencies for lands, rights, and equipment necessitated the preparation and negotiation of numerous leases and sale contracts. The irrigation program, of importance in furnishing food, forage and fiber essential to the successful prosecution of the war, continued to present the usual volume of difficult legal problems.

During the course of the year the Solicitor, or members of his staff, appeared before the courts in behalf of the Secretary of the Interior and other officers in many matters affecting the Department. Attorneys assigned to the immediate office, as well as bureau counsel and attorneys in the field, actively participated in the preparation of cases, in cases referred to the Department of Justice and, in many cases, cooperated with attorneys of that Department in the actual presentation and trial of cases. The two most important cases decided during the year were those argued by the Solicitor before the United States Supreme Court, in each of which the position taken by the Department was upheld. The decisions in these two cases, *United States v. Fe Pacific Railroad Co.* (Walapai case), and *State v. Sampson*, climaxed a record commenced in March 1933 in which the Department has been successful in every case before the high court where the validity of departmental action by this Administration has been challenged. The unanimous decision of the Supreme Court in the Walapai case affirms the possessory rights of the Indians in lands to which they have occupied from time immemorial, even where title to such lands has been granted to a railroad. The Sampson case affirms the sanctity of Indian treaties and denies the contention that such rights must yield to State laws; it is expected to have a far-reaching influence in the interpretation of Indian treaties where they deal with fishing rights in the Northwest. These two ex-

to a sweeping and significant victory for a minority people against the claims of a dominant majority, and are evidence of the sacredness with which the United States upholds its obligations toward the aboriginal owners of the continent.

Other litigation of particular interest included the cases of *Dow v. United States* and *Gilbert v. Ickes*, which were finally determined in favor of the Secretary of the Interior by the Court of Appeals for the District of Columbia, the United States Supreme Court denying certiorari. In the two cases were attempts to compel the Secretary to modify certain provisions of the Alaska Fisheries regulations. Certiorari was also denied by the Supreme Court in the case of *United States v. General Petroleum Corporation of California*, 125 F. (2d) 928, where the Circuit Court of Appeals for the Ninth Circuit upheld the position of the Department with reference to a regulation by the Seneca Tribal Council canceling some 800 leases in the town of Salamanca on the Allegany Indian Reservation. In the case of *United States v. General Petroleum Corporation of California*, which is presently in the course of trial, the United States is seeking an accounting of over 3 million dollars in oil royalties alleged to be due on account of oil and gas produced and sold from Federal lands. It also seeks to establish the authority of the Secretary of the Interior to fix, pursuant to the Mineral Leasing Act of February 25, 1920, reasonable minimum valuations for the purpose of computing royalty due the United States. Other cases either handled or participated in by the Department's attorneys include: *Nebraska v. Wyoming*, *Colorado v. United States, Intervener*, pending in the Supreme Court of the United States; *United States v. Orr Water District*, and *United States v. Alpine Land & Reservoir Co.*, pending in the United States District Court for the District of Nevada, in which the United States is asking, among other things, to establish the ownership of unappropriated water of nonnavigable streams. Important questions of law concerning the valuation of reservoir and power sites are involved in the case of *United States v. Washington Power Co.*, pending on appeal in the United States Supreme Court. A decision in favor of the United States in the United States District Court of Appeals for the Ninth Circuit, and *United States v. Bend Transit Co.*, pending in the United States District Court for the District of Washington.

The preparation of opinions, decisions and legal memoranda constituted a very important part of the work of the Solicitor's Office, and during the year more than 600 opinions and over 3,000 memoranda on matters requiring legal interpretation were prepared and disposed of. The problems presented involved matters of vital concern to the efficient and lawful administration of the affairs of the Department. As has been indicated, included many unique problems growing out of the war program.

The regulation of the fishing industry in Alaska and certain bills pending before the Congress seeking to revise the laws regulating the

commercial fisheries of Alaska and the Pacific salmon fishery have invoked numerous legal and administrative problems. The legislation necessitated extensive analysis with respect to the significance and implications of the proposed changes in the law and several important memoranda were prepared in respect thereto. One important opinion held that the Secretary of the Interior has authority to limit the number of salmon traps which may be occupied in the territorial waters of Alaska on an individual, concern or combination. The annual revision of the Alaska Fisheries regulations also required the preparation of opinions by the Solicitor to the Secretary with respect to the original occupancy rights of Alaska Indians in the light of the decision in the Walapai case and, among other things, it was decided with respect to areas which may be shown to have been subject to aboriginal occupancy, fish trap site locations in Alaskan waters not be closed to Indians in contravention of established Indian rights.

The revision and preparation of the new Federal Range Code of the Conservation Division of the Solicitor's Office, in consultation with the Acting Chief Counsel of the Grazing Service, was a matter of paramount importance. The new code reflects the policy of the Department in the regulation of the range since the passage of the Taylor Grazing Act; it clarifies and develops the provisions of the existing code in accordance with the experience of users of the range; its provisions represent a practical, conservative attempt to assure the orderly, efficient utilization, development and preservation of the vast grazing resources of the Nation.

Approximately 170 laws directly affecting the Department of the Interior were enacted during the fiscal year. The nature and scope of the subjects covered is indicated by the following list of the more important statutes enacted during the year:

Public, No. 539 (H. R. 6020).—Granting the consent and approval of the United States to an interstate compact relating to the better utilization of the fishery resources (including shell and anadromous) of the Atlantic seaboard and creating the Atlantic Marine Fisheries Commission.

Public, No. 151 (S. 178).—Authorizing the Secretary of the Interior to grant oil and gas leases on certain lands.

Public, No. 586 (H. R. 5394).—To authorize the lease or sale of public lands for use in connection with the manufacture of arms, ammunition, and explosives of war, and so forth.

Public, No. 381 (H. R. 3019).—To amend the act entitled "An act to regulate the manufacture, distribution, storage, use, and possession in time of war of explosives, providing regulations for the safe manufacture, distribution, use, and possession of the same, and for other purposes," approved July 1917 (40 Stat. 385).

Public, No. 624 (S. 2066).—To make permanently effective the act to regulate interstate and foreign commerce in petroleum and its products.

Public, No. 197 (H. R. 4816).—To facilitate the construction, extension, and completion of interstate petroleum pipe lines related to national defense and to promote interstate commerce.

Public, No. 356 (H. R. 4854).—To facilitate and simplify the administration of the Federal Reclamation laws and the act of August 11, 1939, as amended.

Public, No. 214 (S. 173).—To amend section 61 of the National Defense Act of June 3, 1916, as amended, for the purpose of extending to Hawaii, Alaska, Puerto Rico, and the Canal Zone the permission to organize military units not a part of the National Guard which was granted to the States by the amendment made to such section by the act of October 21, 1940.

Public, No. 392 (H. R. 5822).—To establish a military code for the Territory of Alaska.

Public, No. 586 (H. R. 5394).—To authorize the lease or sale of public lands for use in connection with the manufacture of arms, ammunition, and implements of war, and so forth.

The reorganization of the legal work of the Department, which has been in the process of development during the past two fiscal years, has resulted in a substantial drop in the numerical volume of routine matters passing through the immediate office, in the elimination of considerable duplication of effort, and in the saving of much time formerly expended in routine review. Final disposition by bureau counsel of numerous classes of matters susceptible of determination at the bureau level, and the institution of the divisional system in the immediate Office of the Solicitor, whereby responsibility for final disposition of certain matters has been vested in the division chiefs, have made it possible for the Solicitor to devote his personal attention more fully to matters presenting legal questions of first impression or of sweeping significance.

The volume of legal work moving through the immediate Office of the Solicitor is indicated by the following table which shows the number of recorded items passed upon during the fiscal year 1942:

Requests for Solicitor's opinions.....	604
Legal memoranda and correspondence.....	3, 008
Legislative matters.....	1, 705
General Land Office matters.....	5, 834
Geological Survey.....	178
Bureau of Mines.....	1, 604
Petroleum Conservation Division.....	34
War Minerals Relief Commission.....	12
Grazing Service.....	178
Office of Indian Affairs.....	9, 801
Bureau of Reclamation.....	175
National Park Service.....	721
Division of Territories and Island Possessions.....	104
Division of Investigations.....	88
Fish and Wildlife Service.....	167
Bituminous Coal Division.....	31
Matters handled by Counsel at Large, Alaska.....	775
Construction and supply contracts.....	134
Miscellaneous matters.....	113
Total.....	25, 266

In addition to the matters directly passed upon in the immediate Office of the Solicitor, a much larger number of matters were disposed

of by the attorneys who, while acting under the supervision of the Director, are directly attached to the various bureaus of the Department.

The office of the Chief Counsel, National Park Service, handled approximately 20,000 matters during the fiscal year and it is estimated that at least 3,000 matters were handled in the field. It was necessary to draft many agreements and to revise various regulations to facilitate the means whereby the Army has been able to use lands under the jurisdiction of the Park Service for camp sites and for military purposes.

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The volume of public-land litigation and trespass work in the Division of the General Land Office increased substantially during the fiscal year 1942. Sixty-five cases were referred to the Department of Justice for appropriate action resulting in the collection of \$205.13, as compared with 31 cases and \$47,347.52 collected during the preceding year. The sum of \$35,979.17 was collected in settlements of trespass on the public lands by administrative proceedings conducted under the supervision of the Law Division as compared with \$477.50 collected during the preceding year. In the aggregate the Law Division of the General Land Office during the fiscal year received, considered, and disposed of a total of 42,055 items.

During the fiscal year 1942 the legal staff of the Geological Survey disposed of approximately 2,880 diversified matters. The work related primarily to mineral leasing operations, chiefly to oil and gas. Unit plans submitted pursuant to existing statutes necessitate considerable legal attention. At the present time unitized operations govern the recovery of 46 percent of all crude oil and 56 percent of gas produced from public lands. Legislative reports were prepared in connection with several mineral bills designed to promote the utilization of the natural resources of the Nation.

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Secretary Ickes. The Division's duties subsequently were increased by the establishment of the Office of Fishery Coordinator by Executive Order.

In meeting these responsibilities, the Division issued a total of 342 press releases during the year. The increase of 342 over the previous fiscal period represented in large measure the volume of information material made mandatory under the Mine Safety Act.

Maintaining the organization authorized by Congress, the Division of Information consists of an editorial branch, a radio section, a photographic section, and a publications section.

Radio Section

The facilities of the Radio Section were shared by the Department of the Interior throughout the year with other agencies of the United States and of foreign governments in the dissemination of information concerning the United Nations' war activities. Operating one of the best equipped broadcasting and recording studios in the country, the Radio Section rendered full cooperation in the preparation of programs which, since the Studio maintains no transmitting equipment of its own, were broadcast through the cooperation of commercial radio stations of the United States.

Among the governmental agencies utilizing the services of the Radio Section during the year were the Army and Navy, the Office of Emergency Management, Office of War Information, War Production Administration, Office of Facts and Figures, Office of the Coordinator of Information, Office of the Coordinator of Inter-American Affairs, United States Maritime Commission, War Manpower Commission, Department of Agriculture, and the United States Public Health Service.

Several hundred programs were prepared for the United States Army and Navy for use in special training work.

In addition to its work in preparing programs for these agencies, the section also produced programs in various languages and presented important speakers for shortwave broadcasts, at the request of the Office of Coordinator of Information and the Office of War Information.

In the past year, more than 250 programs concerned with the activities of the Department of the Interior were prepared by the Radio Section. Time for these programs was made available at no cost by major networks and by local radio stations throughout the country. All in all, a total of over 2,500 stations used these programs from the Department of the Interior, representing a total number of air presentations of over 3,300.

Photographic Section

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aiding service for all its bureaus and agencies, as well as furnish photographic illustrations pertaining to its varied activities to the press and other publications. This work included the furnishing of illustrative material for textbooks, guidebooks, pamphlets and travel literature requested by many types of educational, technical and scientific magazines.

Outstanding photographic projects of the year included field work in a number of western national parks and national monuments, and a photographic study of the work of the Office of Land Utilization in the western States. During a visit of members of the Argentine Congress to the United States in April, a departmental staff photographer was assigned to accompany this group on its tour, under the direction of the Office of the Coordinator of Inter-American Affairs.

In addition to its work for the various bureaus and agencies of the Department, the laboratories and equipment of the Photographic Division were made available to outside governmental agencies for the production of material involved in their war programs.

Motion-picture activities were drastically curtailed during the year through the relinquishment of the motion-picture laboratory space to the War Department for its use in connection with the preparation of special training films for use in the armed forces and other branches of the Department. Nevertheless, the section collaborated in the production of a series of 12 motion-picture films with Spanish and Portuguese subtitles for circulation in South American countries, at the request of the Division of Cultural Relations of the Department of State.

Publications Section

A streamlined procedure to promote speed and efficiency in the production of printed information essential to the war was put into effect during the past year by the Publications Section, which serves as the liaison agency between the Department of the Interior and the Government Printing Office. A production control system was instituted to insure early delivery of technical bulletins, pamphlets, statistical data, maps, charts, etc., required by the war agencies of the Interior and other departments.

At the same time, drastic curtailment was brought about in the advance and distribution of informational material not essentially concerned with the war, through a revision of the publication programs of the various bureaus and a sharp revision of mailing lists maintained by the Department.

Substantial progress toward further economy in departmental printing costs was accomplished by the preparation of standard forms for handling routine administrative matters, and the adoption of steps for the conservation of paper supplies.

Board on Geographical Names

GEORGE C. MARTIN, *Executive Secretary*

THIS Board is official authority on use of geographic names by the Federal Government. It decides unsettled questions on form, spelling, or application of names for use on maps and charts and in publications by the Government, and considers new names proposed by Government officers. The Board also serves as informal authority in non-Government use of place names and gives information on names, and on location and identity of little known places, on request from Government and other sources as far as facilities permit.

The Board consists of an advisory committee in which the Government and some geographic societies are represented, which acts chiefly by its executive committee, and of an administrative and investigative unit, the Division of Geographic Names, in the office of the Secretary of the Interior. The advisory committee, June 30, 1942, included:

W. L. G. Joerg, National Archives (chairman); Lt. Comdr. K. T. Adams, Coast and Geodetic Survey; Roscoe E. Baber, Government Printing Office; Clarence Batschelet, Bureau of the Census; James M. Darley, National Geographic Society; E. E. Carter, Forest Service, Department of Agriculture; William J. Dixon, Post Office Department; Capt. Walter F. Jacobs, Hydrographic Office, U. S. Navy; Col. Lawrence Martin, Library of Congress; W. C. Mendenhall, Geological Survey, Department of the Interior; Raye R. Platt, American Geographical Society of New York; Mrs. Sophia A. Saucerman, Department of State; John R. Swanton, Bureau of American Ethnology; and Frank E. Williams, Geographical Society of Philadelphia.

The Advisory Committee held one meeting during the year. The Executive Committee held 16 meetings at which 444 names were approved. Decisions on those names will be included in a pamphlet entitled "Decisions of the U. S. Board on Geographical Names Rendered Between July 1, 1941, and June 30, 1942," which can be obtained from the Board without charge when published.

The location by geographic units of the approved names and the

number in each were: Minnesota 106, Alaska 56, California 40, Oregon 38, Washington 25, Texas 24, Louisiana 22, North Carolina 22, Florida 19, Arizona 16, Massachusetts 14, New York 8, Montana 7, Vermont 7, Colorado 5, Mississippi 5, Alabama 4, Connecticut 4, Maryland 4, Idaho 3, Virginia 3, Bahama Islands 2, North Carolina-Tennessee 2, Utah 2, Delaware 1, Georgia (Russia) 1, Hawaii 1, Maine 1, South Carolina 1, Tennessee 1.

The sources of requests for decisions and the number from each source were: Coast and Geodetic Survey 188, Forest Service 153, Geological Survey 59, War Department 18, Office of Indian Affairs 15, National Park Service 5, State organizations 4, Bureau of Reclamation 1, Library of Congress 1.

Interior Department Museum

H. L. RAUL, Museum Curator

SINCE Pearl Harbor the attendance in the museum has largely increased due to the influx to the National Capital of servicemen and new Government workers recruited throughout the Nation. These visitors find in the Interior Department Museum a graphic visualization, carefully designed and presented by methods easily understood, of the history, aims, and the current activities of the Department.

During the past year, approximately 55,000 persons visited the museum and visitors from all of the States in the Union were recorded in the Visitors' Register. Registrations were received also from Alaska, the Canal Zone, Puerto Rico, Hawaii, and the Philippine Islands; also from Argentina, Australia, Bolivia, Brazil, Canada, China, Costa Rica, Dominican Republic, England, France, Mexico, Soviet Union, and Uruguay.

Recent additions and improvements have greatly enhanced the popularity of the museum. Pursuant to the order of the Secretary placing the Department on a war basis, the museum has been augmented with new exhibit features reflecting the intensified and enlarged activities of the Bureaus in fields vital to winning the war. Eight panels based on the war program are shown in appropriate Bureau galleries under the following title labels: The War Program of the Department of the Interior; Metals for War; Oil for War; Power for War; Fuel for War; Helium for War; Food for War; Land, Water, Timber for War. An illuminated pedestal case, with changing transparencies, and label text emphasizing the war importance of every Bureau, has been installed at the museum entrance.

A first-aid animated diorama demonstrating the Schafer prone pressure method of artificial respiration, as taught by the Bureau of Mines, has been installed for public information as well as to assist the first-aid classes which for months have been meeting in the museum. A new exhibit, How to Deal With an Incendiary Bomb, has been installed. This exhibit shows a full-size incendiary bomb model and cross section with instructions for rendering the effect of

the bomb harmless. A new exhibit pertains to the Coal-Mine Inspections Act under which the Bureau of Mines makes inspections and investigations in coal mines; another exhibit explains the amended explosives act governing the licensing, by the Bureau of Mines, of the manufacture, possession, sale, purchase, and use of explosives.

In the interest of safety, many rare and original historical documents displayed in the museum are now provided with replacement photostat facsimiles.

During the past year the museum educational facilities were augmented by the installation of three picture projection devices. A silent motion picture projector shows first-aid and other departmental films. A motion picture cabinet with sound is in operation showing important departmental films. The cabinet has been allocated to the museum through the cooperation of the Bureau of Reclamation, Fish and Wildlife Service, National Park Service, and the Bonneville Power Administration. An automatic slide projector with changing series, 70 slides to each program, also features departmental activities. By order of the Secretary, a similar projector is maintained by the museum as an extension service for servicemen at the National Capital Service Men's Club in Washington.

Upon request the museum furnished Princeton University with exhibits for use in the university defense course on military planning and construction and the emergency war course on photogrammetry. Assistance in scale-model and camouflage techniques was rendered by the museum to the Army. In addition, the museum during the year complied with various requests from the Navy Department, the Department of Agriculture, the Pan American Union, and other agencies.

Special attention has been given to revisions and additions to the standing exhibits of the several Bureaus transferred to other cities. It is realized that with the decentralization of Bureaus to locations distant from Washington, the Interior Department Museum has an increased responsibility in making available to the public a visual representation of the Bureau's activities during their absence from the National Capital.

During the year many display cases were redesigned or amplified, and the Fish and Wildlife Service Exhibit Gallery, comprising 10 display cases and 7 wall niches, was installed. To meet a need of visiting students of Government procedures, this new gallery was especially designed to explain in full detail how the actual organization of a Bureau is accomplished and how its work is performed in all its functional and regional activities.

The museum cooperated with the Bureau of Reclamation and the Television Program Department of the Columbia Broadcasting System in supplying museum exhibit materials for program use.

This marked the first time that exhibit materials of the museum have been shown by telecast and suggest interesting future possibilities.

Among the accessions acquired during the year are included additional 512 specimens of the Gibson Collection of Indian materials, purchased by order of the Secretary, 1936, transferred to the National Park Service to the custody of the museum. These specimens complete the Gibson collection, being supplemental to the materials exhibited in 25 display cases located in the main alcoves. Another important acquisition is the Fish and Wildlife Service Fuertes Collection, consisting of 50 original paintings in color of Birds Common to the United States by Louis Agassiz Fuertes. Five additional old and rare books on fishes and fisheries have been added to the rare book collection placed in the custody of the museum. Two large silhouettes entitled "The Opening of the War" and "Modern Surveying," were designed and installed in the General Office Gallery. A colorful and outstanding new exhibit is a war drum used in the ceremonies of the Iroquois Indian Confederacy in declaring war upon the Axis nations. Also included are dioramas, display cases and other exhibit materials.

During the past year 5 special exhibits were prepared and displayed by the museum in collaboration with the Bureaus, featuring the following subjects: Specimens Illustrating Some of the Geology shown in U. S. Geological Survey P. P. 146, Part 2, Micro-fossils of Texas; Scene Near East Base and Antarctic Nocturne, painting in oil by Leland Curtis, Antarctic Expedition, 1939-40, Department of Territories and Island Possessions; Indian Sculptures by Juan Nunez del Prado, Bolivia, by invitation of the Secretary; Exhibit Map of Costa Rica by Carmen Madrigal Nieto; Selected Materials from the Museum Collections.

Using the facilities of the museum, approximately 4000 students from high schools located in States east of the Mississippi River participated in two student institutes of Government conducted by the National Capital School Visitors Council. A Teacher's Institute of Government from the University of Maryland also conducted a study of the museum displays. Public and private schools were given conducted tours of the museum galleries throughout the year.

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Annual Report

**THE SECRETARY OF
THE INTERIOR**



FISCAL YEAR ENDED JUNE 30, 1943

Annual Report

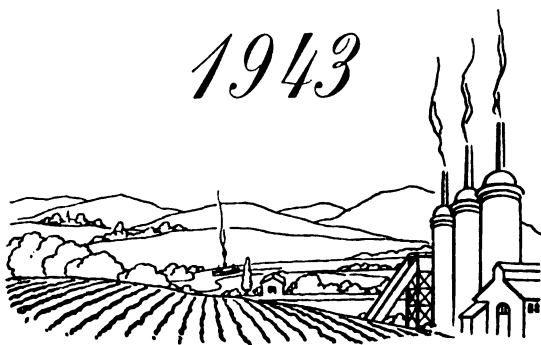
OF THE SECRETARY OF

THE INTERIOR

FOR THE FISCAL YEAR

ENDED JUNE 30

1943



United States
Department of the Interior
HAROLD L. ICKES, *Secretary*

**For sale by the Superintendent of Documents,
Washington, D. C. ★ Price 40 cents**

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Letter of Transmittal

The Secretary of the Interior

HAROLD L. ICKES, Secretary

MY DEAR MR. PRESIDENT: This report covers 12 months during which the Department of the Interior has been tested rigorously for those virtues which, it is sometimes said, have vanished utterly from the regular departments of the Federal Government.

In our biggest job, that of mobilizing the Nation's natural resources for war, we have been tested for agility in improvising new tactics on the field as new challenges arose and old ones changed, for economic performance, and for resistance to that wartime itch for overcentralized authority. In our secondary job, the prosecution of a minimized but inescapable conservation program, we have been tested for the plain gumption that is needed to know what to stop doing for the Nation's good as well as what to do, and for our ability to prepare for peace in time of war.

You will notice that our job is, by brief and limiting description, the same as it was last year. That is because we assumed the job of marshaling the Nation's natural resources on the very day that Pearl Harbor was bombed. But despite identical labels, this year's work has differed from last year's. It is one thing to conceive and launch a great new program, and a quite different thing to push the program through when the obstacles loom in front. This has been the year of the big push, and execution has been a real test, as I have said.

From the very beginning, we have labored under a modern version of the ancient and vexatious command to make bricks without straw: we have had to do more, vastly more, with less and less to do it with. The huge new war-production plants of the West depended upon us for more hydroelectric power to make more implements of war—more ships, more tanks, more planes. The normal ways of increasing power, the installation of more generators, the construction of more dams and more transmission lines, were barred. The construction materials that we needed were needed elsewhere. There was a man-

power shortage to contend against, and other obstacles were numerous and formidable. We had to push for larger food crops, but to economize on scarce materials, many projects that might have extended irrigation were closed. We had to promote the production of more fish and fishery products despite a shortage of fishermen and fishing equipment. The world looked to the Federal ranges for more meat, but in order to concentrate on even more pressing war needs we had halted many activities that keep the ranges conditioned to fatten cattle.

Being denied the normal means of increasing the production of one resource after another, we turned to other means. We narrowed our demands for materials with which to build for increased power to that which was essential to the national safety, then pleaded the case for that minimum convincingly enough to get it. Or, we moved a generator from the plant for which it was intended to another plant at which it could produce power quicker or to better advantage. Where larger catches of fish that are customary food were not possible, we persuaded the industry to land edible species which were taken with the usual catch, but formerly discarded because they were not in demand. Then we persuaded consumers to accept these species as food.

The important thing is that, in the end, we did vastly increase production. We doubled our output of hydroelectric power. We increased our capacity to produce power by nearly half a million kilowatts. The salmon pack in western Alaska will exceed last year's pack by about a million cases. Despite our shattered range-improvement program, 85 million more pounds of meat were taken from the Federal range this year than last. We can report progress also in our search after the ores from which industry extracts the metals that armies and navies fight with. In response to the smelters' appeal for more zinc and copper for war, we revealed domestic reserves which contain 33 million pounds of copper, and 8 million tons of zinc and zinc-lead ores.

We not only did these things and many others: we did them economically. We cut this year's budget 10 million dollars below the amount which you approved, and voluntarily began operations on a budget that was 25 percent below the appropriation for the previous fiscal year. During this fiscal year we prepared next year's budget, scaling it down to 66 percent below the appropriation for 1943.

We achieved many of our economies by abandoning activities which could be dispensed with temporarily, and by minimizing others which could be curtailed, if not eliminated. I have heard that Federal departments never stop any activity until forced to do so, but we have

suspended many operations aside from those that ceased for lack of men and materials. The Grazing Service alone held in abeyance a score of range-improvement projects. I have already reported the gains which particular bureaus made despite their curtailments. Other bureaus and offices economized similarly, but contributed impressively to victory just the same.

To take up the question of our ability to prepare for the future, is to continue the discussion of these deferred projects. We have consolidated them into a vast post-war work program, and we have kept the working plans for these projects up to date, ready to unfold and follow when the firing ceases. We could launch much of our program within 30 days after victory. On one type of project alone—power and irrigation construction—we could keep 480,000 demobilized service men and war workers gainfully employed for 3 years—225,000 of them at construction sites and 255,000 in the plants and factories that would provide materials for the developments. When complete, this construction would open farm settlement opportunities to 165,000 families.

We have wrestled with the problem of keeping the huge new industrial plants of the Northwest busy when peace comes. They have grown up on the low-cost power which we provide, and flourish now on war production, but what shall they manufacture and to whom shall they sell it when the last war contract is finished? The Bonneville Power Administration, which distributes this power, searched diligently for the answer during the year with some encouraging results, and the search continues.

We have kept in mind the huge contribution which the United States will have to make to replenish the world's war-depleted larder. Consequently we gave an important place in our post-war program to irrigation projects. We are prepared to extend irrigation to 6,000,000 additional acres, and to supplement the water supply which now irrigates 9,000,000 acres, but which irrigates them inadequately. Six of our bureaus have worked together, and continue to work, on a food production program that embraces extended irrigation, range conditioning for the production of more meat, various means of increasing the production of fertilizer, the further tapping of fish and wildlife resources, and much besides.

We also continued to prepare for the day, only decades—not centuries—in the distance, when our liquid fuel reserves will be depleted to dangerously low levels. To cushion the shock of that inevitable occurrence, we furthered our experiments in extracting liquid fuels from coal and oil shales which are abundant.

Instead of centralizing authority, we tended generally toward decentralizing it. In particular, we decentralized one of our most powerful and far-reaching functions; that of directing local use of Reclamation projects in accordance with Federal conservation policies. We established six regional offices and appointed local directors to give order to the use of power and irrigation projects which are now in operation, and to recommend new projects in accordance with the varying needs and prevailing practices of their respective regions. They are not free, of course, to override fundamental conservation policies; but they are granted "extensive latitude for independent action," in behalf of their communities within the ample premise of sound conservation policies.

I have not expressly mentioned the assistance which some of the bureaus and offices of the Department have given me in my capacity as Petroleum Administrator for War, Solid Fuels Administrator for War, and Fisheries Coordinator. But that assistance has been considerable, and in some instances a Departmental bureau or office has been the mainstay of an extraordinary agency.

You will find a fuller account of the regular and special functions of the various bureaus in the remainder of this letter, but even that account will not be as detailed as usual because we have cut our report to half-length for economy's sake as we did last year. Still, I think that you will find enough detail to support my assertion that we have been through a severe test, and enough about the results to determine whether we have acquitted ourselves well or have failed.

THE BUREAU OF MINES

The United States, manufacturing for war at a record-breaking pace, called for an unprecedented production of minerals. In response the Bureau of Mines again took a leading part in finding new ore reserves and in devising methods for their rapid utilization in the multi-billion-dollar production program of American industry.

Blast and open-hearth furnaces required more ore, more flux, and more coke. The Bureau of Mines, with 32 years of progressive research in all fields of the mineral industries, found usable iron-ore deposits in 20 States to provide potential supplements to the iron reserves currently utilized; and intensified its experiments in the production of sponge iron as a possible substitute for steel scrap. It promoted the production of high-quality coke of a uniform grade; it carried on extensive exploratory work to help the output of fluorspar for flux; and assisted in the greater recovery of ore from operating underground iron mines.

Smelters called for more ore for zinc and copper to provide weapons and equipment for war materials and lend-lease. The Bureau's exploratory projects revealed additional domestic ore reserves containing 33,000,000 pounds of copper, and disclosed 8,000,000 tons of zinc and zinc-lead ores, substantial amounts of which are being brought into production.

The demands for mercury increased steadily and the Bureau sent its crews into seven mineral-bearing areas to increase the known reserves of cinnabar. At the end of the year they had made known more than 600,000 tons of ore.

The production of 6,000 or 7,000 war planes monthly resulted in a heavier drain on domestic bauxite for aluminum. In less than a year the Bureau's engineers had increased the known reserves of bauxite by more than 10,000,000 tons and, in addition, had charted some 100,000,000 tons of alumina-bearing clays for possible future use.

Such achievements by the Bureau were added to the long list of war-time accomplishments which date back 21½ years before Pearl Harbor when the Bureau, at the direction of the Congress, embarked on the long-needed inventory of the Nation's mineral wealth.

Because many of our domestic ores are lean in war metals or are difficult to beneficiate, the Bureau conducted studies to determine which low-grade ores could be processed advantageously, which could not be, and which method should be applied to those that could be processed. Thousands of samples were analyzed. By this rapid, authoritative system of reporting to industry the comparative amenability of various ores to processing, the Bureau helped to eliminate costly, chance-taking explorations of doubtful deposits.

Advancements were made in the methods of producing chromium, manganese, vanadium, cobalt, copper, nickel, molybdenum, tungsten, and other war metals from complex or low-grade ores. When significant findings occurred, the war agencies and appropriate industries were advised regarding the Bureau's progress. Simultaneously, the Bureau gained steadily in cooperative research projects, undertaken with industry, to solve specific problems.

Significant attainments resulted from exploratory, laboratory, and pilot plant work in nonmetallics. Millions of radio insulators, made from domestic talcs tested by the Bureau, were processed in a Bureau laboratory to aid the manufacture of essential communications equipment for the armed forces. Exploratory crews proved that there were deposits of more than 1,000,000 tons of flake graphite, and the War Production Board approved the building or reconstruction of mills to process this domestic graphite.

In analyzing more than 23,000 samples of coal for Federal agencies, particularly the Army and Navy, whose purchases of solid fuels total several millions of tons annually, the Bureau saved considerable sums of money for the Government. Coal-storage and coal-procurement problems were brought to the Bureau by industry and solutions were provided by experts who have had long experience in those fields. One such problem involved the storage of 50,000,000 tons of coal on Great Lakes docks. To help solve the fuel-oil shortage problem, the Bureau cooperated with an oil company in operating a boiler plant on colloidal fuel, a mixture of pulverized bituminous coal and bunker C fuel oil.

The Bureau embarked on laboratory-scale investigations of the indirect process for making synthetic gasoline, oil, and other petroleum products from coal and continued its research in the direct hydrogenation process. Although the experiments in coal hydrogenation were launched by the Bureau in 1935, they came into greater prominence during the year because of recurring gasoline shortages for civilians, and because of the growing concern over the depletion of domestic petroleum reserves.

Symbolic of the Bureau's ability to dovetail its activities most effectively with the whole war program was its production of helium for Navy antisubmarine blimps, for meteorological balloons, and for a dozen other essential uses. From its plant at Amarillo, Tex., and from a newer plant that was completed during the year the Bureau pushed production of the lightweight, inert gas to about 25 times that of 1941. To supply anticipated needs, the Bureau rushed the construction of three other helium plants in the Southwest, and drilled additional wells in the Texas helium field. Every demand for this noninflammable gas by the armed services was met.

Demands for special lubricants and 100-octane gasoline for war planes, the need for more chemicals for explosives, and the heavier use of gaseous fuels by industry threw greater emphasis on the Bureau's special research in petroleum and natural gas. Several new research programs were begun, and the Bureau's findings helped to increase the production of high-test gasoline, benzene, toluene, and other petroleum byproducts. A mobile field laboratory was dispatched to petroleum fields to speed the flow of technical information to operators. An extensive field-testing program was undertaken for a natural-gas reservoir in the South-Central area, and valuable assistance was given the Petroleum Administration for War by the Bureau through its studies of deep, high-pressure fields of the Gulf Coast.

The health, safety, and plant-security activities of the Bureau increased manyfold as Americans in war production worked closer to-

gether, for longer hours, and at higher speeds. As the need to conserve manpower, equipment, and other plant facilities of the mineral industries became more pressing; safety experts in the Bureau gave first-aid training to more than 45,000 workers; and coal-mine inspectors visited more than 1,100 mines in the United States and Alaska to investigate health and safety practices and to counsel workers and officials on safer methods of performing their jobs so that the wartime production of coal would not lag. Improvements in many mines resulted from this work and, despite a general increase in industrial accidents, numerous mines cut their accident toll while increasing their output.

In administering the wartime Federal Explosives Act, a barrier to sabotage, the Bureau investigated 9,000 stores of explosives, approved the granting of more than 350,000 licenses under the act, and investigated accidents in which nonmilitary explosives or their ingredients were involved. Plant-security studies of the Bureau—another wartime assignment—were conducted at nearly 2,000 mines and related facilities. Many inspections were made jointly with Army officials.

The special confidential laboratory experiments and studies undertaken by the Bureau for the Army, the Navy, the Maritime Commission, and others closely associated with the prosecution of the war, increased in number and scope. Typical experiments inquired into the characteristics of explosives, metallic and nonmetallic dusts, gases, vapors, and liquids, the safety qualities of protective equipment, and the prevention of accidents involving the handling of inflammable materials.

Assisting such war agencies as the War Production Board, the joint War Production Board, Office of Price Administration Quota Committee, the War Manpower Commission, and the Solid Fuels Administration for War, the Bureau completed many special studies which provided these offices with up-to-date interpretative facts regarding the production, consumption, uses, stocks, and other information involving mineral commodities. The Bureau provided specific information about war minerals to hundreds of inquirers each month.

THE GEOLOGICAL SURVEY

The Geological Survey also did much of its work in response to industry's insatiable demand for mineral commodities. War-production demanded not only more of the materials that are ordinarily recognized as of strategic importance; it also demanded more of many

minerals, the supply of which had hitherto been considered adequate, because deposits were abundant, or because demand had been slight.

The Geological Survey was especially qualified to evaluate the sources of needed minerals in the United States and in other American Republics. Its Geologic Branch was on a war footing, acting as a fact-finding organization and as an adviser on policies of mineral production and problems of reserves. During the year more than 700 mines and mineral areas were examined, and reports of the findings were made to various Federal agencies, in response to their direct requests in many instances.

In addition to studying mineral deposits, the Survey assigned about 30 geologists to help meet the increasing demands of the War and Navy departments for geologic information about strategic foreign areas. This information was for use in military engineering abroad.

One of the outstanding activities of the Geological Survey was (and still is) the compilation by its Alaskan Branch of aeronautical charts which were needed by the Army air forces. In the course of that work trimetrogon planimetric mapping covering 2,146,000 square miles of strategic areas, widely distributed throughout the world, was completed. The high quality of the product and the speed and the low cost at which it was made available established records. This remarkable performance was made possible through the utilization of the Survey's engineers who are skilled in rapid reconnaissance field surveys and who have trained a special force of assistance to use the unique methods and special apparatus that have been designed largely by the staff of the Alaskan Branch. In this work they have had the close cooperation of members of the Survey's map reproduction plant in the use of all its facilities.

The Topographic Branch emphasized the making of maps within the strategic areas outlined by the War Department. Of 241 quadrangles for which maps were published during the year, 160 were within the strategic areas; of 228 quadrangles for which mapping was completed, 166 were in such areas, and of 456 quadrangles for which work was in various stages of progress at the close of the year, 416 were in strategic areas. These figures indicate the importance of the Geological Survey's part in the military program. The aerophotogrammetric unit at Clarendon, Va., with increased production facilities and working two shifts, continued to accomplish a large amount of photogrammetric mapping. This unit also maintained a central laboratory for designing, testing, repairing, and adjusting all types of special optical and mechanical equipment which was needed for stereophotogrammetric work. Up to the present time, 47.1 percent

of the total area of the United States has been covered by adequate topographic maps which the Survey has produced.

The strategic importance of water in all human activities is accentuated when those activities are directed to the waging of war. Military establishments and war production plants are scattered from coast to coast, and many problems of water supply confronted them. The geologists, engineers, and chemists of the Geological Survey helped to solve them, and contributed effectively in a surprising number of other ways to the success of the war.

The information on water accumulated in the routine reports of the Water Resources Branch affords a dependable basis for the wise planning of water projects related to the war. This information was adapted to local problems and was supplemented by many special investigations. During the year more than 4,000 special reports on water were made to military agencies; to industrialists and engineers engaged on war contracts; to municipalities that sought to enlarge their water-supply systems in order to serve new concentrations of population; to producers of power who were obliged to build or enlarge power plants to increase the supply of electric energy for use in manufacturing establishments; and to irrigation engineers who were assisted by this data in expanding irrigation systems for the production of more food.

The water experts of the Survey have served also with the armed forces, either as officers or civilians, in obtaining water for the armies in the field, where a wide variety of new situations extending even up to the fighting lines must be met quickly and surely.

Increased demand for minerals, fertilizers, chemicals, water power, and petroleum accelerated prospecting on the public domain and on certain Indian lands which are under the supervision of the Geological Survey. The conservation and development work fostered by the Survey includes surveys and investigations of water and mineral sources and supervision of certain phases of mineral and power production on these lands. The production of coal, sodium, potassium salts, phosphate rock, and crude oil from public lands during 1943 was substantially greater than in 1942. On Indian lands an increased production of coal, vanadium and petroleum, and the working of substantially lower-grade lead and zinc ores were reported.

Continuing efforts, though hampered by manpower shortages, are affording enhanced consultative activities, accelerated field investigations and studies, particularly in regard to secondary recovery methods and an increased contribution of minerals from federally supervised land in support of the war program.

THE BUREAU OF RECLAMATION

Wherever American troops have fought this year they were better equipped and better fed as a result of the contribution of the Bureau of Reclamation. Guns, tanks, and planes were produced in large quantities in plants that operated on power which was generated on Reclamation projects. Much of this matériel was carried to fronts on which it was sorely needed in ships that were built with power from the same source. Troops and civilians at home and abroad were provided with food that was grown on land which Reclamation projects irrigated. Industrial and military concentrations tapped Federal reservoirs for homes and plants and barracks.

The Bureau's continued expansion of power production for war was impressive. The output of 30 plants on 19 projects—9½ billion kilowatt-hours—was double the 1942 total. The production was equivalent to that of all plants in the 11 far Western States 20 years ago. Nearly half a million additional kilowatts were developed during the year. The capacity is now 1,850,000 kilowatts—twice the Bureau's pre-Pearl Harbor installation.

Most of 900,000 kilowatts that were made available in a 2-year period were installed 2 to 10 years ahead of schedule, at Boulder, Grand Coulee, and Parker Dams. These giant structures were erected in time of peace as part of the Department's far-sighted policy in planning for construction to keep ahead of the inevitable industrial expansion of the West. In terms of war equipment, the new generators potentially are capable of providing annually the power required to build 30 large battleships, or to construct more than 11,000 "Flying Fortresses".

The production of essential foods on the 4,000,000 acres of land that were irrigated by Reclamation facilities in 15 Western States, also contributed toward victory. From these highly-productive areas, once desert wastes, came enough beans to provide an annual supply for nearly 22 million persons, enough potatoes for 13 millions, (through alfalfa fed to beef and dairy herds) enough beef for 4½ millions, and milk for 3¾ millions.

Even greater harvests of food crops may be expected this fall as the result of the response of irrigation farmers to the plea of the War Food Administration to shift from the less essential to the more important war crops. Spring plantings of potatoes this year were 44½ percent greater than last year, and the bean acreage is 36 percent higher. The 1943 cultivated acreage on Reclamation projects is expected to be the largest ever reported.

The huge irrigated yields are materially reducing cross-country shipments of certain foods, chiefly processed meat and dairy products, on which the West has always been dependent. This releases transportation facilities for other war activities and saves large quantities of fuel and equipment required to operate trains and trucks.

The gross value of crops produced on the land that was served by Reclamation works during the calendar year 1942 was \$272,048,516, an increase of more than 45 percent over the 1941 value and a 100-percent gain over 1940.

Conditions beyond the control of the Bureau prevented it from carrying out in full the power program outlined in 1941. This called for increasing the installed capacity to more than 3,300,000 kilowatts by 1945-46. Studies showed that the industrial demand of the West would absorb the output of the additional generators. The War Production Board, however, took the position that critical materials were more urgently needed in other war activities, and stop-construction orders were issued against the 865,600 kilowatts. The Bureau was permitted to proceed with installations which will increase the capacity of its projects to 2,436,000 kilowatts by October 1944—placing more generating equipment under its control than that of any other agency—Federal or private.

In order to grow more food for war, I directed the Bureau, in 1942, to prepare an irrigation construction program which would enable the West to increase agricultural production. But the requirement for the critical materials for other purposes was regarded as more acute, and nearly all irrigation construction was halted later in the calendar year 1942.

In the war food program which was submitted to the Department of Agriculture in March 1943, the Bureau indicated that by 1947 it could extend irrigation services to more than 9,000,000 additional acres, provided that critical materials, manpower, and funds were provided promptly. The program was modified later to embrace projects which would produce a more immediate effect through services to 2,000,000 additional acres by 1943. By June 30, clearances had been given by the War Production Board on projects aggregating less than 300,000 acres. Committees of the Congress joined in recommending irrigation construction as a means of advancing war food production, and additional substantial appropriations of funds were made.

In addition to power and irrigation services, supplemental municipal and industrial water was provided for cities, military concentrations and industries in areas served by Reclamation projects. In all, nearly 5,000,000 persons live in western regions which look to the Bureau for these services.

At the end of the fiscal year, 71 projects were in operation, under construction, or authorized. Fifty-two of these were for generating power or supplying water for irrigation and other beneficial uses. On or near practically every Reclamation project are air bases, other military establishments, and war industries, including aluminum and magnesium plants, airplane factories, shipyards, chemical and other manufactories.

The storage capacity of 81 reservoirs reached a new high, or more than 64 million acre-feet of water during the year. The active storage content on June 30 was 43½ million acre-feet.

While war contributions were of paramount importance during the year, attention also was focused on the problems due to arise in the post-war era. In anticipation that the Nation will be called upon to provide employment and settlement opportunities for the returning service men and war workers, the Bureau continued to assemble an impressive list of projects for construction during the post-war period.

Included in this program will be projects on which work has been halted or retarded during the war and about 50 others for which blueprints will be ready when the victory is won. It is estimated that 3 billion man-hours of work could be provided if this public works program can be carried out in full. It would extend irrigation to 15,000,000 acres of land, and would provide 3,300,000 new kilowatts of power for war industries converted to the production of peacetime necessities.

I have already referred to the decentralization plan for this Bureau as an indication of our willingness to disperse authority. I also expect that this reorganization, which provides for four major branches with offices at Denver in addition to the six regional offices, to increase our efficiency. The greater number of interrelated and complex problems arising from the construction and operation of the many Reclamation projects for irrigation, power, and related purposes, makes a closer coordination of Bureau activities essential, particularly during the war. For the long-term program, I believe that the decentralization will bring the people of the West into closer contact with the many functions which affect so vitally the future of a third of the Nation's land area.

THE SOLID FUELS ADMINISTRATION FOR WAR

The difficult task of assuring an adequate supply of coal for war industries and for essential civilian uses was carried out successfully during the past fiscal year and steps were taken to provide, so far as possible, assurances of a continued supply in the future.

Pursuant to your Executive order of April 19, 1943, directing me, as Secretary of the Interior, to serve as Solid Fuels Administrator for War, I established this office, which absorbed the personnel, records, and programs of the Office of Solid Fuels Coordinator for War which I had established under your instructions in 1941.

The present office, under its broad authority, has been carrying out your Executive order of May 1, 1943, directing the Secretary of the Interior to take possession and control in behalf of the Government, of coal mines in which work stoppages had halted or were threatening production. The Administration continued to serve as the Government's agent in operating the mines during the next 2 months, through periods of new work stoppages, until I transferred the operation of the mines to the Coal Mines Administration.

The Solid Fuels Administration and its predecessor, the Office of Solid Fuels Coordinator, has worked in close cooperation with the coal industry. Through its Solid Fuels Advisory War Council it has initiated and coordinated policies to the end that the Nation's coal supply might be adequate.

Coal production in 1942 totaled an estimated 580,000,000 tons of bituminous and about 60,000,000 tons of anthracite, thus exceeding estimate of the year's requirements. The surplus bituminous coal went into stock piles, as a result of a coal stocking campaign which was carried on by the Office in the summer months of 1942. These stock piles reached record heights during November and, although they had dropped as the result of rising consumption, prevented many production losses by industry during the coal mine strikes in May and June.

To meet the estimated requirements of 665,000,000 tons for 1943, I prevailed upon mine operators and labor to agree to lift their former 35-hour workweek limitation. The 42-hour workweek which was adopted made possible the maintenance of production despite continued losses of mine manpower to the armed services and to other industries.

The necessity for coal to meet the requirements of consumers who had converted from fuel oil to coal, to provide transportation for coal to areas where requirements had been greatly changed by the war, to supply anthracite for Eastern States, to make sure that vital mines were not handicapped by lack of equipment and repair parts created complex problems.

Many of the problems continue. Manpower shortages will make it difficult to compensate for production stoppages which occurred during the strikes. Conservation in the use of coal may help to restore the balance. If shortages should develop, the Administration will

put into effect programs to assure an equitable distribution of the available coal.

THE BITUMINOUS COAL DIVISION

Although there had been furnished impressive evidence that the Bituminous Coal Act was an essential part of the Nation's war machinery and that its mechanisms were efficient and workable for the peacetime stabilization of the chronically distressed bituminous coal industry, the Congress permitted it to expire automatically August 23, 1943.

The opposition to the act which developed at a hearing before the Ways and Means Committee from June 21 to July 5, 1943, on several bills for its extension was based on contentions that the act established a system of regulation which is inimical to free competition and constituted an undesirable precedent for the establishment of post-war business regimentation. It was urged that it had been rendered unnecessary by the establishment of the Office of Solid Fuels Administration for War and by improved conditions in the industry, and that the strikes in the coal mines because of the inability of management and labor in the bituminous coal industry to reach a wage agreement demonstrated that the act had not stabilized the industry.

While the opponents of an extension of the act admitted that the industry had achieved stability with respect to costs and realization during the period that the act was in operation, they insisted that this rehabilitation was attributable solely to wartime expansion in demand for coal. While contending that the act had nothing to do with the rehabilitation of the industry, opponents also argued that it had resulted in exorbitantly higher prices to the consumer of bituminous coal.

Abundant testimony was placed before the committee to show that the Coal Act did not provide an alien or novel system of regulation, but only precluded unfair methods of competition, and did not fix the price at which coal had to be sold, but only fixed the price below which coal could not legally be sold. It was demonstrated that the bituminous coal industry is composed of between 12,000 and 17,000 scattered business units and, like agriculture, has been consistently depressed because of the typical inability of the diffused industry to regulate a situation in which a relatively few strong buyers can play against each other numerous necessitous sellers. No testimony was offered before the committee to substantiate a belief that the Bituminous Coal Act would form a pattern for post-war business regula-

tions any more than the Act to Regulate Commerce in 1887 has furnished an all-time business regulatory pattern.

The record showed that the functions of the Secretary of the Interior as Solid Fuels Administrator for War were different from those of the Department under the Bituminous Coal Act, and that the existence of a sellers' market did not dispense with the necessity of maintaining the stabilization factors provided by the act.

It was indicated clearly that the inability of labor and management in the coal industry to negotiate a wage agreement consonant with the law could not be attributed in any way to the Coal Act because nothing in the act compelled either labor or management to reach an agreement. However, the removal of the assurance to the industry of the recovery of the cost of production furnished by the minimum price structure under the act might well make the execution of a wage agreement by the operators and mine workers more difficult.

For approximately 15 years prior to the enactment of the Bituminous Coal Act, the industry's yearly losses ran to millions of dollars. The Bituminous Coal Division offered the committee a precise statistical measurement to show that this loss continued through 1940 until October 1, the date on which minimum prices under the act became effective. There was no indication that the situation was improving. However, during the final 3 months of 1940, with minimum prices effective, the industry as a whole operated at a slight profit, and has continued to operate with a profit since. This rehabilitation cannot be attributed to exorbitant prices which have been prejudicial to the consumers, since the minimum prices in existence during the hearing on the extension of the act were only 29 cents a ton higher than the average depressed going prices of 1939.

It has been shown that the bituminous coal industry, because of the economic conditions that I have mentioned, has suffered distress for many years during periods which were unrelated to general periods of prosperity or depression. Between 1923 and 1929, generally prosperous years in other industries, 3,274 mines with an annual production of 1,000 tons or more each went out of business. While the impetus of the industrial activity due to the war may temporarily relieve these conditions, there is no foundation for believing that it will remedy them permanently. Unquestionably, instability in the coal industry remains, with the expiration of the act, an unsolved economic problem.

The stabilization of the industry through the operation of the minimum price structure accounts for its ability to meet unprecedented wartime coal requirements. The Bituminous Coal Division, the administrative agency of the act, accomplished many specific war-

time tasks for many agencies. This work either will have to be abandoned or accomplished by agencies established at additional expense.

THE BONNEVILLE POWER ADMINISTRATION

The Bonneville Power Administration was able to more than double its power deliveries to war industry during the year, despite shortages of material and construction curtailments.

Only through the availability of power produced at Bonneville and Grand Coulee Dams was it possible for plants in the Northwest to produce ferroalloys for the armoring of thousands of tanks, and aluminum for airplanes. These two great dams were also the source of motive power and electric heat for the high speed production of merchant and naval vessels, and for the manufacture of many other essentials of war.

These things were made possible only because your administration steadfastly pursued its policy of developing the Northwest power resources well in advance of need.

This policy enabled the Bonneville Power Administration to meet continuous new calls for industrial production with a power supply and transmission facilities from the great dams on the Columbia River.

Bonneville and Grand Coulee Dams were first put under construction 10 years ago. At that time, and during the years following 1933, many persons expressed skepticism as to the need for the Columbia River development. But if this development had been required to wait until Pearl Harbor, the Nation's war production program would have been held back for years and there would now be few war industries of consequence in the Pacific Northwest.

In addition to tremendous power deliveries directly into war industry over the Federal transmission system, the Administration supplied nearly 1,000,000,000 kilowatt-hours to the systems of 10 other major Northwest utilities, thus enabling them to meet their war commitments. The formation of this wartime power pool, one of the largest in the country, was in conformance with the instructions of your administration, as set forth in the War Production Board's Order L-94. One utility system, interconnected with Bonneville, depended upon the Administration for virtually one-third of its entire power requirements. When it is considered that this utility system serves one of the most congested and productive war industrial centers on the Pacific Coast, the significance of the Bonneville Power Administration's contribution to the Northwest power pool becomes at once apparent.

In wartime, weapons, not dollars, are of first importance. Yet it is worthy of note that, during the fiscal year 1943, the Bonneville Power Administration collected more than \$11,000,000 in revenue, from the sale of power. This money, more than double the revenue of the preceding fiscal year, brought the total collections by the Administration for the first 5 years of its existence to more than \$18,000,000.

THE DIVISION OF POWER

The work of the Division of Power has related primarily to the supervision of the power operating activities of the Department in a manner intended to assure that the greatest possible amount of power was made available in the war program, efficiently and economically. The work of the Division has increased greatly, due to the large increase in the power output of the plants of the Department and to our shift of emphasis from construction to operating and marketing. The Division consulted and worked with other agencies of the Government, such as the War Production Board, the Federal Power Commission, and the Defense Plan Corporation, in connection with a number of national and local power problems.

An order of the Secretary was issued outlining somewhat more in detail the basic duties of the Division and formalizing certain of the procedural relationships between the Division and the power operating agencies.

The Division staff reviewed a large number of power contracts, most of the effort being required on important and complicated arrangements to provide power for war. Members of the staff also participated with the operating agencies in the negotiation of a number of the more difficult war contracts for the sale of power from the plants of the Department. In cooperation with the operating agencies and other bureaus of the Department, a number of studies of special matters relating to rates, markets, cost allocations, legal problems and other questions were made or initiated.

THE DIVISION OF TERRITORIES AND ISLAND POSSESSIONS

Wartime dislocations overhung the lives of the 21½ million inhabitants of the Territories and island possessions of the United States to a greater extent than in any area of comparable size in all of the mainland. These Territorial areas—Alaska, Hawaii, Puerto Rico, and the Virgin Islands—are geographically isolated from the mainland from which they import most of their supplies. Each is a busy, strategic

base for a part of our global war activities, and, as such, has encountered intensified health, housing, education, and food supply problems.

To solve these complex problems more effectively, the Division was reorganized during the past year and has worked closely with other agencies of the Government.

The strenuous efforts of the Insular and Federal Governments averted the food supply disaster which appeared inevitable in Puerto Rico in the summer of 1942. For a considerable period basic foods, such as rice and codfish, had been virtually unobtainable. Wholesalers and retailers were threatened with bankruptcy as the result of the depletion of stocks. By September of that year food supplies in the island reached bedrock. In October the Civilian Food and Supply Unit was established in this Division. An agreement was reached between the Department of the Interior and the Department of Agriculture under which the Food Distribution Administration, acting for this Department, began procuring foodstuffs on the mainland for distribution by sale to wholesalers in Puerto Rico in accordance with estimates of requirement set up by this Department. The War Shipping Administration allocates varying amounts of tonnage to the Puerto Rican route monthly, and the Interior Department assigns space on these vessels for the food and general supplies needed in the Island.

Since the time the Government took over, food shipments have increased regularly and a stock pile has been built up which would supply the basic needs of the island should there ever be a recurrence of heavy submarine warfare in that area or should there again be a shortage of shipping for any other reason. For the 9-months' period from October 1, 1942, when the Government took over, through June 1943, the average monthly shipments of foodstuffs, grains, feeds and fertilizers compared favorably with those for the three normal years, 1939 through 1941, when, according to Department of Commerce figures, 24,777 tons of foodstuffs were shipped monthly. Although there have been shortages from time to time, just as in this country, the basic products have been supplied since the Government assumed responsibility, and the people of the island have been provided with essentials. Satisfactory shipments have also been made of the general supplies which industry has needed. The Department of the Interior also allocates the shipping space for these supplies.

At the end of the fiscal year arrangements had been made, in accordance with original plans, to turn back the procurement of certain non-essential food items to the regular pre-war channels.

All procurement and shipping arrangements for Puerto Rico and the Virgin Islands have been considered jointly, because the areas are close together and because their supply situations are similar.

Inasmuch as it was realized that any increase in production of island-grown foodstuffs would help relieve the shipping situation and contribute toward insular self-sufficiency, the Department of the Interior, the Department of Agriculture, and the Insular Government assumed responsibility for local planting programs. The Food Distribution Administration distributed the seed to farmers in Puerto Rico and the Virgin Islands at half price and guaranteed a price for home-grown foodstuffs. Under this program the production of rice in Puerto Rico for 1942-43 increased 69.8 percent over 1939-40; legumes increased 26.4 percent; corn 56 percent; and starchy vegetables 22.2 percent.

In the development of the campaign to drive the Japanese from North America, the Aleutian Islands, previously almost uninhabited, have become centers of activity. As the tide of military action has swept westward, the military bases on the Alaska mainland, originally constructed for defensive purposes, have been used increasingly as depots for the transshipment of men and matériel to the islands. Alaska has seen such activity as never before encountered in her entire history. Here, too, large shipments of civilian food and other supplies were made in the fall of 1942. These have been properly warehoused at a number of strategic points in the Territory and replenished from time to time with fresh supplies.

Labor turn-over in Alaska has been heavy with the various Army, Navy, and civilian activities competing for the available supply. Despite the labor shortage and the fact that the winter was one of the most severe in the history of the Territory, the Alaska Railroad maintained its schedules almost without interruption and kept the flow of supplies and military equipment moving steadily.

In August this Department and the Department of Justice opened negotiations with the War Department for the restoration of civil jurisdiction in the Territory of Hawaii. An agreement was reached and on February 8, 1943, various specific functions were officially returned to civilian control.

Civilian defense in Hawaii continues to maintain a high degree of efficiency.

THE GENERAL LAND OFFICE

Due to the foresight of your national conservation policies, the General Land Office was able to furnish from the public lands under its jurisdiction a noteworthy share of the natural resources which

were needed to fight the war and to meet the needs of the United Nations.

More than 5,000,000 acres of the public domain were made available for troop training, aerial bombing and gunnery practice, and other military purposes during 1943, bringing the grand total of public land areas devoted to such war use to approximately 15,775,000 acres—an acreage equal to that of several States. In addition, more than 70,800,000 acres were withdrawn so as to assure the development and production of strategic war minerals, while smaller tracts were furnished for defense plant sites and to provide housing sites for war workers.

An increase by about one-third in the amount of gasoline and butane produced from the public domain was recorded during the year, and other mineral products were secured for military use under the system of public domain leases which were maintained by the General Land Office.

Despite the heavy volume of its war work, this branch of the Department maintained its position as one of the few executive agencies in the Government which operates at a profit to the Federal Treasury. Returning \$4.25 for every \$1 spent, its cash receipts were \$9,758,066.48 as compared to \$2,304,416.39 in expenditures. Incidentally, 1943 was the second consecutive year in which total cash receipts exceeded \$9,000,000.

A great advancement was made in the program of your Administration for sustained-yield forest management on 2,500,000 acres of Oregon and California revested railroad grant lands, which will assure a permanent economic stability for communities and industries in that lumber-producing region in western Oregon. At the same time, efficient operations within the limitations of prudent conservation practices made possible the furnishing of approximately 417,000,000 board-feet of lumber for war use—lumber which ranged from heavy structural timber to airplane woods. These timber sales from the area produced nearly \$1,000,000 for the 18 Oregon counties in which the lands are situated.

Contributing its share to the supply of food, fiber and leather for fighting men and civilians, the public domain during 1943 afforded an opportunity for the grazing of livestock on 11,978,000 acres of land outside of Federal grazing districts in the continental United States and in Alaska.

During the year, 14 separate agencies of the Federal Government, including the Army and Navy, called upon the General Land Office for accurate field surveys of land areas under their jurisdiction. The development of production of potash and sodium in California, mag-

nesium in Nevada, coal in Utah and Wyoming, and timber in Oregon, was facilitated by these cadastral engineering activities.

The investigation of more than 4,000 mining claims to clear sites, selected by the Army and Navy for military purposes, was made by the Branch of Field Examination during 1943, the first full year of its operation as an agency of the General Land Office following its reorganization from its prior status as a departmental division.

In addition to its administrative responsibilities under the more than 5,000 public land laws, the General Land Office met many requests from Federal agencies and from the Congress for expert cooperation in the consideration of problems concerning the national land pattern.

THE OFFICE OF LAND UTILIZATION

The Office of Land Utilization, established pursuant to departmental Order No. 1466, dated April 15, 1940, to coordinate the land-management functions of the Department, continued its operations under the policy which prevailed during 1942, namely, a concentration upon activities which were either directly or indirectly related to the prosecution of the war. Immediate results have been increases in timber production, improvement in western range lands and the maintenance of a high degree of protection against subversive action, forest and range fire hazards, and sabotage seeking to disrupt or destroy strategic production facilities on lands under the jurisdiction of the Department.

Under date of March 12, 1943, the Office of Land Utilization was charged with the additional responsibility of representing the Department in all matters pertaining to the operation of work camps for conscientious objectors which operated on lands under its jurisdiction. At the end of the fiscal year there were 10 camps assigned to the National Park Service, the Fish and Wildlife Service, the General Land Office, and the Bureau of Reclamation. The work of these camps was revised during the year with a view to placing more emphasis on forest and range protection, thus materially strengthening the protection organizations of the Department.

THE GRAZING SERVICE

The conservation principles which are fostered under the Taylor Grazing Act of 1934 paid a dividend in 1943 amounting to 85 million more pounds of meat than was produced on the Federal range during the previous year. In reaching this new high figure, totaling nearly 900 million pounds of beef and mutton, the "free range" of earlier

days became an important cog in the Nation's war machine. In addition, several million acres of public land were used by the armed forces for training in aviation, bombing, chemical warfare, and as proving grounds.

In giving priority to war activities, the Grazing Service constructed 782 miles of access roads leading to 30 different types of strategic war minerals. As a result, thousands of additional tons of war materials were delivered to production lines on time. One road in Colorado made possible a tenfold increase in the delivery of vanadium ore to reduction plants.

One thousand, six hundred and fifty-five war emergency licenses were granted for 271,245 livestock, enabling producers to put more meat on the market. A total of 10,777,793 livestock, owned by 22,019 stockmen in 10 States, used the range under regular licenses and permits. The labor and other war conditions influenced a trend toward more cattle and less sheep. This change influenced the increased tonnage of livestock products that reached trade channels during the year.

THE NATIONAL PARK SERVICE

The National Park Service, reduced to a wartime staff, devoted itself to its primary function of protecting and maintaining the national parks and monuments, and at the same time made definite contributions to the war program.

Threats to invade the National Park System for logging, mining, and grazing purposes grew imminent during the year. Several concessions were made to further the prosecution of the war, but the basic policy that all reasonable alternatives must be exhausted, and that the demand must be based upon critical necessity rather than upon convenience, was applied in all cases in order to prevent any unnecessary sacrifice of distinctive park values.

On this basis, 403 permits were issued to military and war production agencies for the use of areas and facilities in the National Park System. It is estimated that it would have cost more than \$30,000,000 to have purchased these lands, structures, and services had the National Park Service not been able to make them available. It is impossible, moreover, to evaluate the benefits derived by more than 1,655,720 members of the armed forces who visited the parks during the fiscal year. There is ample justification for keeping the national parks and monuments open to those members of the armed forces who are being given opportunities to visit the inspiring American scenes which symbolize the greatness of the nation which they are fighting to preserve.

Although it was necessary to discourage civilian use of transportation resources involved in long-distance travel, approximately 6,572,500 civilians were able to visit the national parks.

The National Park System involves less than three-fourths of one percent of the total land area of the United States. Yet it is preserving for this and future generations some of the finest aspects of America. Under conditions of total war, this concept of conservation has faced the most critical challenge of its history. We have had to reaffirm basic park principles, and to ward off those who, under the cloak of patriotism, would reopen old issues as to the exploitation of the lands which Congress and the American people have decreed should be held inviolate for the national good. Some sacrifices in the common cause have been necessary, and more may be inevitable. But I believe that we can emerge from the war without departing from the basic idea that the national parks and monuments must be protected as symbols of our national greatness.

THE FISH AND WILDLIFE SERVICE

For an organization whose activities ordinarily are geared to the ways of peace, the Fish and Wildlife Service is very much in the war. The largest of all the National wildlife refuges under its administration, the Aleutian Island chain, was the scene of hostilities. The Pribilof Islands, to the northward, summer home of the famous and valuable fur seal herd, which for years has been so successfully managed by the Service, were evacuated at the request of the military authorities, and the native populations and administrative personnel are maintaining themselves in leased quarters on the mainland. Requested photographs, and information on the meteorology and typography of Alaskan and Siberian areas were furnished to war agencies. Military operations and other factors incident to the war in the region prevented full scale fishing. Consequently there was a considerable decrease in the halibut, herring, and salmon catches, despite every effort to achieve the maximum utilization that would be consistent with the conservation of the fisheries resource.

More than one and three-quarter million acres on 35 Federal wildlife refuges in the United States have been assigned to the military forces for training areas. Eleven of the larger vessels in the Service's fleet were transferred for war purposes.

Service personnel assisted the War and Navy Departments in patrol operations for the security of Alaska, in the detection of subversive activities, in the appraisal and acquisition of lands, and in the search for warmth-conserving and windproof furs and fabrics. We helped

to salvage the hides of deer and elk that were killed by hunters, and to control rats which destroy clothing and food supplies. We have worked to suppress plague-carrying field rodents, a menace to the health of troops, and to eliminate burrowing species that create hazards on air fields.

Food and fur production was intensified on wildlife refuges and on Indian lands. Fish propagation was directed toward the multiplication of the more valuable food species and toward increased cooperation in the farm fish-pond program. Campaigns to establish fisheries and to increase the catch were carried on in the Caribbean area and in the South Pacific. The utilization of previously little exploited fishes and other aquatic food animals was developed. Additional sources of vitamin oils and of seaweed gums that could be substituted for agar were investigated. We helped to increase the production of domestic rabbit meat for human food by amassing information on rabbit raising that reached every State.

To conserve tin, the use of nonmetallic containers for fisheries products and increased employment of dehydration and salting were recommended. To overcome a fiber shortage, substitutes for manila were brought to the attention of the fisheries industry.

Predator and rodent control was vigorously prosecuted to safeguard essential food and fiber resources by protecting sheep, goats, calves, and poultry from the onslaughts of predatory animals and by protecting growing crops, stored agricultural products and processed foodstuffs from destruction by field rodents and rats.

Law enforcement activities for the protection of both terrestrial and aquatic wildlife were continued with good results. Research, though carried on at a reduced rate, was never more important to the proper functioning of the administrative and regulatory operations of the Service.

THE OFFICE OF THE COORDINATOR OF FISHERIES

The Office of the Coordinator of Fisheries was established by Executive order on July 21, 1942, to meet a critical situation which had been created by the impact of war upon the fishing industry. Although fishery products—high-protein foods, industrial and therapeutic oils, and animal feeding meals—were needed more urgently than ever before, the industry had been so hampered by the requisitioning of vessels, the loss of men, shortages of gear, and by security regulations in coastal waters so that the catch of fish and shellfish in 1942 declined about a billion pounds as compared with 1941.

To the Coordinator of Fisheries was assigned the task of giving the industry direct and immediate assistance in its problems of manpower, equipment, and operation. Our goal was to increase the yield of urgently needed fishery products and to eliminate waste and inefficiency in the utilization of these essentials.

After a year of effort, marked by notable cooperation from the industry, we are able to record definite progress. For example, the pack of salmon in western Alaska this season is running ahead of last year's by about a million cases. A considerable number of boats, no longer urgently needed by the military services, have been returned for use in fishing, and still more are coming back. Comprehensive programs of operation, designed to make the best possible use of available materials and manpower, have been adopted for two of the major fisheries—salmon and pilchard. New products have been developed for civilian consumption or Government purchase by means of utilizing species formerly neglected.

The condition of the fishing industry is definitely improved as compared with last year. We are confident that the coming months will bring a further advance.

THE OFFICE OF INDIAN AFFAIRS

Eighteen thousand Indians are in the armed forces. They serve with distinction on every front where our Army and Navy are engaged. These Indian warriors come from families comprising fewer than a half million men, women, and children of aboriginal descent in all of the United States and Alaska.

Considering their small numbers, I think that equally significant are the Indians' contributions at home. The Indians are mainly direct war producers, either as the owners of large herds of cattle, as owners of land which grows food crops, as owners of forests and vital mineral deposits, or as a ready source of labor in our less populous West. Few Indians work solely for civilians.

In 1942, the Indians produced and sold food enough to sustain for 1 year 200,000 of the best-fed soldiers in the world, or an army of 6 million men for 1 week. Notable was their production of beef cattle and sheep, totaling almost \$13,000,000 in 1942 as compared with top livestock sales of \$4,000,000 during the last war. I am unable to measure the Indians' production as wage workers off of the reservations, but I am glad to report that employers who have employed Indians for the first time during this war have combed the reservations seeking additional Indian labor.

It would not have been possible to maintain production on Indian lands in the fall of 1942 and in the spring of 1943, if Indian women and children had not willingly replaced men. Indian women are cooking in lumber camps and assisting in cattle round-ups. They dip sheep on the Navajo Reservation, drive trucks, repair heavy machinery, and at the Menominee Indian Mills, Wisconsin, women are working in the sawmills and in the forests for the first time in Menominee history.

We are indebted to an 89-year-old Navaja woman, Mrs. Rose Daniels, for a new variety of lima bean which is on the market for the first time this year. In her odd little seed house on a Utah Reservation, Mrs. Daniels had carefully saved from her garden years ago three lima beans. Horticulturists have developed from her beans a new seed especially suited to a short growing season of a high dry country such as eastern Utah, Wyoming, and South Dakota.

Although ministering to the needs of only a small segment of our population, the Indian Service occupies a unique position among Federal agencies in that it is concerned with all the problems of a community. Its progress in helping a native people to rehabilitate themselves is becoming known abroad. King Ibn Saud, who is anxious to improve the economic lot of his people, invited the Chief Engineer of the Indian Service and a representative of the Department of Agriculture who had worked on soil problems on the Navajo Reservation to comprise a U. S. Agricultural Mission to Saudi Arabia. This mission was completed this year and its recommendations were published by the State Department in English and in Arabic for the use of the King and his advisers.

South American countries have large Indian populations, and 11 distinguished Latin-American educators and soil technicians representing 8 countries spent from 3 weeks to 4 months studying administration on U. S. Indian Reservations this year.

CONCLUSION

That is our record in brief. It reveals that our performance has been imperfect as all things human are. But I am proud enough of it to let it stand without a word of special pleading. I prefer to discuss instead a topic that is not dwelt upon enough: the source from which we derive such strength and wisdom as this report may show us to possess. We derive it from the nation—from the whole people.

The Senators and Representatives who speak for the people whose resources we marshal speak directly to me. The record of congressional inquiries into our performance and our intentions fill a book or several books each year.

XXX

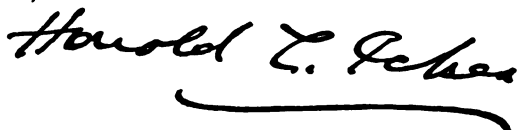
Of the forty-odd thousand employees of the Department, fewer than 5,000 are here in Washington. The others are in the field and are in touch constantly with the people whose resources we manage.

Our bureaus and offices habitually formulate policy in consultation with spokesmen for the people who are affected by our policies, and many policies are also carried out in cooperation with representatives of the people.

We are not remote from the working and fighting fronts of this world. Our key men are on the scene of action in all the fields into which our jurisdiction extends. Our geologists work beside officers of the armed forces day after day to guide the high command at the front in taking military advantage of the geological peculiarities beneath the ground on which battles are about to be fought. Our water specialists work with other officers to reveal the secrets of water resources in countries that are marked for occupation. Some of our scientists go directly to the front in the course of this work.

In a word, so many of us are in such close and constant touch with other persons who work and fight for this Nation; we draw so much of our strength from them, and we are so conditioned by their thinking, that I hesitate to set it down unqualifiedly that we regulate anything. If we do, then it is certain that in doing so we discharge our part of this Government's obligation to govern with the consent of the governed. We regulate with the consent of the regulated. I am as proud of that as I am of all the accomplishment that is vouched for in this Report.

Sincerely yours,

A handwritten signature in dark ink, reading "Harold L. Ickes". The signature is written in a cursive style with a prominent underline.

Secretary of the Interior.

Bureau of Mines

R. R. SAYERS, Director

FOREWORD

THE Bureau of Mines in 1943 geared every activity to help supply the United States and her Allies with the mineral commodities essential to victory on all fronts.

Constant modification in the Nation's production schedule, arising from alterations in military logistics and strategy and from other war developments, called for frequent variations in planning and performance by the Bureau and the other war agencies of the Government. As the relative criticalness of the various metals and minerals changed, the Bureau shifted the emphasis of its research and exploratory work rapidly to meet each new challenge.

Coincident with its intensive and far-flung search for deposits of unexploited mineral ores within the United States, the Bureau directed all efforts in its metallurgical laboratories and testing plants toward finding means and processes for utilizing such domestic ores and for developing wider uses of known raw materials in war industries. As a result, hitherto unknown deposits of critical and essential minerals were brought into production, many abandoned mines were enabled to resume operations, and the way was cleared for considerable expansion by a number of going operations. The urgent necessity of carrying out the program with maximum speed made more apparent the lack of an inventory of the Nation's mineral resources at the outbreak of the war.

The exploratory program of the Bureau, conducted in part in co-operation with the Geological Survey, made known substantial additional reserves of bauxite, alumina-bearing clays, and the ores of zinc, iron, copper, vanadium, tungsten, mercury, and other critical and essential minerals, as well as ores of tantalum, magnesia, fluorspar, graphite, celestite, and corundum.

Thousands of samples of ore from deposits explored by the Bureau, and specimens submitted by prospectors, geologists, mining engineers, and property owners were analyzed by the Bureau, and many of these were subjected to beneficiation tests to determine their possibilities for use in the war. The Bureau's engineers and metallurgists successfully completed ore-dressing tests on various ores including several of copper, zinc, and beryllium, demonstrated practical methods for mining and recovering manganese-bearing nodules from the extensive manganiferous deposits of South Dakota, developed a process for treating complex lead-copper-cobalt-nickel ore, advanced the Bureau's pioneering studies in the production of high-purity chromium metal by electrolysis, and carried on, among many other experiments, production of sponge iron from various ferrous ores.

On the basis of the results from its extensive laboratory and field work, the Bureau presented to war-production officials several suggested development programs for aluminum, zinc, lead, copper, manganese, mercury, fluorspar, magnesium, tungsten, and other necessary materials. The difficulty and necessary delay in obtaining essential equipment for its laboratories and pilot plants prevented the Bureau from pursuing its research, testing, and development work with the speed it had set as desirable. Such problems were particularly acute in connection with the projects on sponge iron, alumina, zinc, and electrolytic manganese and various other electrometallurgical processes. The Bureau made available the results of its investigative and research work to the other war agencies of the Government and to private industries with which it had worked cooperatively on numerous projects. The integration of research work was expedited by the establishment during the year of the Interdepartmental Mineral Resources Operating Committee in which the Bureau of Mines represented the Department of the Interior.

The Bureau's knowledge and long experience in fuel testing and research enabled it to make valuable contributions to the war program. As industry pushed to new production levels coincidental with the temporary curtailments of coal output and increasing transportation difficulties, the Bureau was called upon to advise on the substitution of available coals near their points of consumption and on the substitution of coals more suitable to the needs of the particular consumer. Technical advice also was furnished to facilitate production of high-quality metallurgical coke of uniform grade for the steel industry. The Bureau's sampling and testing of millions of tons of coal purchased by the Army and Navy and by other Government agencies, as well as its testing and analysis of boiler water samples, increased the efficiency and power of federally operated plants and at the same time saved the taxpayers many thousands of

dollars. To demonstrate possible saving of fuel oil by industry, particularly in the critical-shortage area of the East, Bureau engineers, in cooperation with private industry, successfully demonstrated the use of colloidal fuel (a mixture of pulverized coal and petroleum) in a commercial boiler. In solving many problems involving the storage of coal and suitability of various different types of equipment, the Bureau worked in close cooperation with the Solid Fuels Administration for War.

The Bureau's long-range studies in petroleum and natural gas proved helpful to industries seeking new production records in special lubricants, high-octane aviation gasoline, materials for synthetic rubber, and similar essential byproducts. Petroleum engineers undertook special tasks at the request of the Petroleum Administration for War and provided data which aided production programs. The Bureau's new petroleum field office at Franklin, Pa., completed nine projects destined to aid the output of aircraft lubricants from the Appalachian region. Production of helium continued upward as the Bureau began operation of a new plant and speeded the construction of several others to assure sufficient supplies of the non-inflammable gas for the Army and Navy and for essential civilian uses.

The Bureau's research on explosives, begun a number of years ago in order to promote the development of safer blasting materials and methods for the mineral industries, increased in volume and in range in response to the call from war agencies for information regarding the characteristics of various explosives. The Bureau's work included examination of high explosives, analyses of seized military devices, studies of the ingredients of Army ammunition, and development of methods of handling explosives and pyrotechnics. In connection with its studies on nonmilitary explosives for use by industry, the Bureau made hundreds of gallery and control tests as well as chemical examinations and brought the total of permissible explosives on its list to 180.

Health, safety, and plant-security programs of the Bureau became more significant during the year as the problem of industry in protecting life and property in the face of accelerated production, longer hours, and labor and equipment shortages became acute. Trained engineers inspected nearly 2,000 mines and related plants under the Facility Security Program of the Government and advised operators how to guard against sabotage, subversive activities, accidents, and other occurrences which might interrupt war production. Federal coal-mine inspectors visited mines in virtually all of the coal-mining States and Alaska and reported the adoption of many Federal recom-

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The Bureau's research on explosives, begun a number of years ago in order to promote the development of safer blasting materials and methods for the mineral industries, increased in volume and in range in response to the call from war agencies for information regarding the characteristics of various explosives. The Bureau's work included examination of high explosives, analyses of seized military devices, studies of the ingredients of Army ammunition, and development of methods of handling explosives and pyrotechnics. In connection with its studies on nonmilitary explosives for use by industry, the Bureau made hundreds of gallery and control tests as well as chemical examinations and brought the total of permissible explosives on its list to 180.

Health, safety, and plant-security programs of the Bureau became more significant during the year as the problem of industry in protecting life and property in the face of accelerated production, longer hours, and labor and equipment shortages became acute. Trained engineers inspected nearly 2,000 mines and related plants under the Facility Security Program of the Government and advised operators how to guard against sabotage, subversive activities, accidents, and other occurrences which might interrupt war production. Federal coal-mine inspectors visited mines in virtually all of the coal-mining States and Alaska and reported the adoption of many Federal recom-

mentations resulting in safer working conditions and increasing efficiency. Safety engineers and instructors trained almost all employees of the mining and affiliated industries in first aid. Many personal participated in mine rescue and recovery work following disasters.

The difficulties in recruiting, for its wartime mine safety security program, the skilled personnel trained along the high standards fixed by the Bureau handicapped the regular mine safety program inasmuch as the safety engineers experienced in Bureau work and procedure had to be recalled from their established duties to the new inspectors and investigators and to form the nucleus of emergency services.

The Bureau's staff, nevertheless, was successful in conveying to mine operators and to the State departments of mining the Bureau's policies of service and helpfulness to industry and succeeded surprisingly well in obtaining industry's cooperation. The few criticisms were far outnumbered by commendations.

In administering the Federal Explosives Act to prevent sale and other unlawful use of explosives, the Bureau authorized the granting of more than 350,000 Federal explosive licenses to individuals, persons and firms. Special investigators of the Bureau, working closely with Army and Navy representatives and other war agencies, inspected and issued reports on more than 9,000 stores of explosives.

Facts provided by the Bureau regarding the domestic and foreign production, consumption, and uses of minerals helped the various agencies in their allocation, financing, production, and procurement programs. Almost daily, special studies were undertaken by commodity experts to provide special economic and statistical information sought by such agencies as the Army, the Navy, the Metallurgical Service Co., the War Production Board, the Defense Plant Corporation, the Office of Price Administration, the Petroleum Administration for War, the Solid Fuels Administration for War, and the Board of Economic Warfare.

The Bureau's services in this respect included the collection, analysis, and publication of current and periodical data on all mineral commodities, studies of special economic phases growing out of the war, information on some foreign developments, and general economic studies of the mineral situation.

Bulletins, technical papers, Minerals Yearbook chapters, and other books, all concerned with some phase of the war program, were published by the Bureau, but some curtailment in the printing of technical information was necessitated because of the lack of funds. Several film subjects were added by private industry to the Bureau's list.

of free educational motion pictures. These films were shown on hundreds of occasions to classes of the Army, and Navy, and in the civilian industrial training program.

To assure more effective handling of local problems of the mineral industries and to coordinate all phases of the mineral exploration and metallurgical work in the field, the Bureau established, at the close of the previous fiscal year, three regional offices: A Western Region with headquarters at Salt Lake City, Utah, a Central Region with headquarters at Rolla, Mo., and an Eastern Region at College Park, Md., with a regional engineer in charge of each.

In each of the principal mining States or groups of States, an examination office with an engineer in charge was established under the supervision of the regional engineers. Such further decentralization by the Bureau has given it a better understanding of the problems of mining interests in all parts of the Nation, and has encouraged local initiative in mineral development.

FUTURE WORK

Realizing that the United States, despite the United Nations' repeated victories over Axis forces, must be equipped for a war of indefinite duration, the Bureau of Mines rounded out the 1943 fiscal year by planning an even more intensified program to help speed the domestic production of war minerals.

The Bureau received from the Congress approval for the most extensive exploratory program ever attempted—a Nation-wide search for coking coal, quartz crystals, copper, asbestos, zinc, mercury, tungsten, vanadium, beryllium and other pegmatite minerals, corundum, molybdenum, manganese, tin, iron, chromium, bismuth, and nickel and other minerals for which a critical need may arise.

The Bureau's chemists, metallurgists, engineers, and other technologists will continue to seek and devise the best methods of utilizing known and newly proved reserves of minerals, including those which prove too complex or low grade to exploit by the usual methods.

As in the past year, all work of the Bureau will continue on a war footing. Projects which do not directly or indirectly assist the output of war materials or the security of production facilities and manpower have not been considered in the Bureau's program for the 1944 fiscal year.

Included in the Bureau's wartime schedule for the coming months are the following major activities:

A large-scale pilot plant at Laramie, Wyo., is to be completed and studies are to begin in the solid-fuel reduction method of making

sponge iron which can be utilized to supplement the steel scrap necessary for the operation of steel mills.

Exploratory programs and metallurgical research are to be intensified to help increase the production of alumina for aluminum from domestic materials, including low-grade bauxite, clays, alunite, and other alumina-bearing minerals.

Research in reduction of zinc ores by the use of methane gas will be carried out in a pilot plant nearing completion at Rolla, Mo.

Three new plants will be completed in the Southwest to increase the supply of helium by producing each month many additional millions of cubic feet of this essential gas for war purposes.

New and expanded research involving petroleum, natural gas, and various types of coal will be undertaken for the twofold purpose of facilitating production and conserving the Nation's wealth of liquid, solid, and gaseous fuels. The Bureau also will explore methods for recovering and utilizing anthracite "fines" and will organize a Nationwide campaign to promote more efficient industrial uses of fuels.

The highly successful cooperative campaign carried on with the coke and steel industries to increase pig-iron production for war by improving the quality of coke is to be continued.

Various suggested research programs to assist the anthracite industry will be investigated, such as the prevention of floods, increased production by mechanical mining, industrial fuel oil and oil from anthracite, prevention of fires, protection of equipment from acid mine waters, and the use of anthracite as a fuel for portable gas producers.

The Bureau's long-established policy of gathering and maintaining up-to-date information regarding all phases of domestic mineral production and many of the activities in the foreign minerals field will go forward on a broader basis to serve war agencies relying on this important service.

SUMMARY OF ACTIVITIES

TECHNOLOGICAL WORK

Exploration and Metallurgical Research

Industries of the United Nations called for unprecedented quantities of war materials, and the Bureau of Mines quickened and broadened its search for metals and mineral products, sending its exploratory crews into new areas and maintaining day-and-night schedules in pilot plants and laboratories. Technical information was provided for field crews, the mining and metallurgical industries,

and others vitally concerned with production. To hasten the movement of raw materials from the ground to production lines, the Bureau's three regional engineers maintained close contact with and directed the work of district and project engineers assigned to mineral-rich areas of the United States and Alaska.

Because of the constantly changing economic situation in the mineral commodity field, the Bureau adapted its exploratory work and metallurgical research to increase the domestic output of the most-needed materials in the shortest possible time.

Beneficiation methods were worked out for ore samples submitted by the Bureau's own exploratory crews and by individuals and other Government agencies. Large-scale process projects were undertaken in sponge iron, magnesium, manganese, and alumina under special appropriations from Congress.

During the fiscal year, the Geophysical Division of the Geological Survey was transferred to the Bureau of Mines to aid in the exploratory work. One-third of the division's activities was devoted to a special project for the Navy.

The advancements made by the Bureau in the field of war minerals are reflected in its progress reports for various commodities.

Iron and steel.—The 1943 program to help the Nation maintain its steel-production schedules included continued exploration of the iron ore deposits of the West to serve the newly established steel industry of the Pacific coast, expanded research in sponge iron, laboratory tests of the amenability of ores to concentration, and assisting in the recovery of ore pillars in a New York iron mine by employing Bureau-developed seismic instruments. Major explorations for iron ores were carried on in Utah, Arizona, Oregon, Nevada, New Mexico, Missouri, Iowa, and Alaska. Attention also was directed toward increasing the output of iron ore easily available to eastern blast furnaces.

Small deposits of iron ore, suitable for the production of sponge iron, have been located in 20 States, and during the fiscal year the Bureau's experiments in sponge iron emphasized the possibility of using idle commercial facilities, such as brick kilns, for the production of sponge iron to supplement steel scrap. Sponge iron research progressed at brick kilns in Binghamton, N. Y., and Canton, Ohio.

Preliminary to the operation of its large-scale rotary-kiln pilot plant at Laramie, Wyo., the Bureau produced sponge iron in a rotary kiln at its Boulder City (Nev.) Experiment Station and also in cooperation with a Pennsylvania iron company. Studies in the natural-gas reduction method for making sponge iron continued at a plant in Texas.

To increase the domestic production of fluorspar for steel-furnace flux, extensive dewatering and exploratory work was carried on in the Illinois-Kentucky field, leading producer of fluorspar for the eastern steel industry, and an important potential producer of fluorspar was established by Bureau drilling in Utah to serve the western steel industry. Meanwhile, the Bureau carried on its laboratory work in the concentration of fluorspar, having pioneered and developed improved techniques for the use of concentrates in steel furnaces.

Ferro-alloys.—The increased use of ferro-alloys by industries turning out war equipment prompted the Bureau to carry out exploratory and metallurgical work on chrome, manganese, cobalt, molybdenum, nickel, tungsten, and vanadium.

Exploration was completed on the Bureau's outstanding chrome project in Montana in which several million tons of concentratable ore were charted. This ore now is being mined on a large scale. Several other projects in California, Montana, Oregon, and Alaska resulted in commercial operation. The Bureau's laboratories developed methods for the concentration of some chrome ores, including the chromite beach sands of Oregon. Research disclosed that off-grade chrome concentrates can become high-grade metallurgical products by chemical treatment and pilot-plant work indicated the commercial practicability of the process. Further strides also were made in the Bureau's process for producing high-purity chromium metal from low-grade chromite by electrolysis, the consumption of electricity per pound of metal being much lower than that of ordinary chromium plating.

A substantial tonnage of cobalt-copper ore in Idaho was indicated by the Bureau. The metallurgists developed a suitable method for recovering both cobalt and copper in separate concentrates and worked out a process for recovering lead, copper, nickel, and cobalt in three concentrates from a complex lead-copper-nickel-cobalt ore of Missouri.

Investigating further the production of electrolytic manganese by a Bureau-perfected method, the technologists learned that cobalt, a minor constituent of manganese ores, can be removed effectively from the manganese electrolyte. Small pilot-plant investigations, looking to the utilization of cheap hydroelectric power of the West, were conducted on the separation and recovery of cobalt and nickel from complex ores by employing electrodeposition.

The domestic manganese potential was improved when the Bureau demonstrated practical methods for mining and recovering manganese-bearing nodules from the 10,000,000 long tons of readily minable shale which have been delineated in the Chamberlain area of

South Dakota. Simultaneously, larger-scale tests continued in the matte smelting of nodules to recover manganese, and plans were prepared for exploiting the ore by employing the Bureau's smelting process.

Several millions tons of low-grade nickel ore were indicated by exploration in Colorado, Montana, Oregon, Washington, and Alaska. While nickel cannot be produced economically from these ores by standard methods, it could be extracted at a higher cost should the need for the metal become more acute.

In the Cle Elum-Blewett Pass region of Washington there are indications that a large tonnage of ore containing 0.75 to 1 percent nickel may be developed. While the Bureau continued exploration of this area, a process was developed whereby the ore, containing iron, nickel, and chromium, can be smelted in an electric furnace to produce a nickel-iron alloy having 13 percent or more nickel with virtually complete recovery of the nickel, thus yielding an immediately useful melting stock directly from the ore.

The widespread use of tungsten for special steels in armor plate, guns, and projectiles and other war equipment prompted the Bureau to place still greater emphasis on methods for increasing the Nation's output of this material. During the year more than 100 tungsten properties were examined, 10 exploratory projects were begun and 7 of these—in Idaho, Colorado, Nevada, Wyoming, New Mexico, and Alaska—were completed, and more than 500,000 tons of low-grade ore were indicated. Two projects were outstanding. In Lincoln County, Nev., several hundred thousand tons of tungsten ore were indicated, and in Lemhi County, Idaho, sufficient reserves were charted to supply a 200-ton-a-day mill.

The Bureau's exploratory work in vanadium included projects in the active Colorado-Utah field and the potentially important western Wyoming area. The Bureau conducted laboratory studies of the recovery of vanadium from the Wyoming ore.

Nonferrous metals.—Although the United States is the world's largest producer of zinc and copper, mine output has failed to keep pace with requirements. The Bureau made consistent gains in helping increase their production.

In copper alone 17 exploratory projects were undertaken and 872,000 tons of copper ore containing 33,000,000 pounds of copper were discovered. In Vermont, sufficient reserves of ore were indicated to merit construction of a mill, and this plant went into production in March 1943. In Idaho, 75,000 tons of ore assaying 2 percent copper and 0.3 percent cobalt were indicated. In a southwestern mine, the finding of additional ore justified the expansion of mining operations. An idle

western mine resumed operations after the Bureau's field crews discovered high-grade copper.

To speed the conversion of ore to metal, the Bureau conducted successful ore-dressing tests on materials from three deposits. These tests were (a) for the separation of tungsten from copper minerals; (b) for the selective flotation of copper and cobalt minerals; and (c) for the leaching of copper.

Equally impressive were the gains made in zinc. The Bureau's 20 exploratory projects conducted in 14 States revealed 8,000,000 tons of zinc and zinc-lead ores. Programs now are under way for mining and milling 7,000,000 tons of the newly found reserves. Correlated laboratory tests established ore-dressing methods both for reserves discovered by the Bureau's crews and for a wide range of other ores. As another aid to the zinc industry, the Bureau began construction of a pilot plant at Rolla, Mo., to study the reduction of zinc ores with methane gas.

Seven exploratory projects for mercury were active through the year, and the known reserves of ore were increased by 600,000 tons. This ore averages 4.7 pounds of mercury per ton. In Valley County, Idaho, an exploratory project was completed after 133,500 tons of mercury ore had been indicated. As a result, the output of a mine was doubled. In southwestern Alaska, an exploratory crew charted 115,000 tons of ore containing 9 pounds of mercury per ton. Other work in mercury included the preliminary sampling of 11 deposits in Nevada.

An initial shipment of high-grade tantalum ore from a deposit in New Mexico was concentrated in the Bureau's pilot mill at Rolla, Mo., and exploratory drilling by Bureau engineers revealed the most extensive source now known in the United States. Tantalum is in heavy demand for special war uses, particularly in vacuum tubes for radios and surgical and dental instruments.

Other activities in the nonferrous metals field concerned beryllium and tin. Exploratory work was conducted on beryl-bearing pegmatites in New England, and a drilling crew was sent to the rare helvite deposit at Iron Mountain, N. Mex. Ore from Iron Mountain was tested to ascertain the most feasible method of extracting the beryllium, and new ore-dressing processes were developed to separate beryl from its ores.

Despite adverse weather and difficult terrain, the Bureau's exploratory crews continued their search for tin in Alaska and reported that, although domestic tin reserves are small as compared with foreign resources, the most extensive known sources of tin possessed by the United States are on the Seward Peninsula. Meanwhile, other exploratory work for tin was carried on in Nevada and New Mexico, and

additional deposits in South Dakota, Montana, Idaho, California, and Texas were sampled.

Light metals.—Anticipating the Nation's demands for more aluminum and magnesium for airplanes and other war equipment, the Bureau continued on a larger scale its correlative exploratory, laboratory, and pilot-plant projects for increasing the domestic output of these metals.

Exploratory crews increased the known reserves of bauxite by more than 10,000,000 tons, although much of it proved too low grade for existing plants, which are geared to high-grade imported bauxite and the limited amounts of best-grade domestic bauxite. The Bureau ascertained that much of the low-grade bauxite can be concentrated to produce a suitable feed for the alumina-producing plants (Bayer plants) and proposed to the War Production Board that a mill be constructed in Arkansas to beneficiate the large reserves of low-grade material. By so doing, Bureau engineers ascertained, the low-grade material could be utilized quickly without new facilities other than a mill.

Other exploratory crews established additional reserves of alunite, another alumina-bearing material, which will be mined for alumina plants authorized in Utah by the War Production Board. At the same time, Bureau crews drilled clay deposits in various parts of the Nation and reported that large quantities of aluminous clay are available. In a 12-month period the exploratory crews charted 100,000,000 tons of alumina-bearing clays, and the Bureau's chemists and metallurgists worked unceasingly on methods of utilizing these clays and other low-grade aluminiferous materials, including alunite, to produce alumina. Partly as a result of these studies and the efforts of the Department of the Interior to demonstrate the need for using the Nation's extensive reserves of clay for aluminum production, the War Production Board approved the construction of five plants in Utah, South Carolina, and the Pacific Northwest, each with 50 tons daily output of alumina from materials other than bauxite.

Many months of study in the Bureau's laboratories and pilot plants at Boulder City, Nev., resulted in the development of a process to produce magnesia from a 400,000,000-ton dolomite deposit near Las Vegas, Nev., in the Boulder Dam area. The dolomite deposit is in the vicinity of the Basic Magnesium, Inc., plant, and utilization of the Bureau's process could eliminate a difficult transportation problem because material now used for the plant is transported more than 1,000 miles by rail. In addition to the process worked out for Sloan dolomite, the Bureau advanced in its studies in producing magnesia from impure magnesite by the acid-leaching process. At the same

time, small-scale pilot-plant work was completed on the Bureau's newly developed method of producing magnesium metal directly from magnesite made either from the dolomite or from impure magnesite. Other research by the Bureau in the carbothermic reduction process for producing magnesium from magnesite is continuing.

Large quantities of iron-free alum are needed urgently in the war program for use as a catalytic agent, and the Bureau's chemists developed a process for obtaining this product from domestic clays.

Nonmetallic minerals.—Largely because of the Bureau of Mines' work, the United States was freed from dependence upon imported talc suitable for high-frequency insulators in military radio equipment. Prior to the war only one mine in the United States produced a satisfactory-grade talc for this purpose, but examination, testing, and processing of talc deposits by the Bureau revealed that sufficient supplies are available from domestic sources. Millions of radio insulators for planes, tanks, and ships were processed in a Bureau laboratory.

Since more flake graphite is needed for war uses—as a lubricant, for foundry facing, and in the manufacture of crucibles, stoppers for steel ladles, and core washers—The Bureau explored two groups of flake graphite deposits in Alabama and proved the existence of 1,174,000 tons of measured ore. Following the Bureau's work, three graphite mills, under the WPB program, were constructed or rehabilitated and put into operation in the Alabama field. Graphite prospects also were examined by the Bureau in Pennsylvania, New York, and Texas.

Exploration of Texas celestite (strontium) established 130,000 tons of celestite which can, if necessary, be concentrated to meet the requirements for military pyrotechnics. Strontium minerals are used chiefly for tracer bullets and flares, military experts looking upon strontium as the best all-around tracer for both day and night use.

Activity increased in the examination of domestic deposits containing abrasive-grade corundum for grinding optical glass. Five former corundum mines were visited by the Bureau, and four were recommended for exploratory projects.

Research workers in nonmetallics prepared a syllabus for the qualitative testing of domestic clays to ascertain their adaptability to specific uses in place of clays formerly imported.

Coal and Coal Products

Increased production of high-quality coke of uniform grade, testing of thousands of coal samples, efficient storage of millions of tons of coal, production of synthetic liquid fuels from coal, conditioning of water fed to Government boilers, and conversion of heating systems

from oil to coal headed the many war problems studied by the Bureau of Mines as the Nation leaned more heavily on solid fuels.

In a 12-month period nearly 23,000 samples of coal were analyzed in connection with fuel purchases by Government agencies, particularly the millions of tons used by the Army and Navy. Testing all coal purchased by the Army, the Bureau's coal-sampling trucks visited 500 mines in 18 States and obtained 1,500 specimens. The volume of work in the testing of water fed to boilers was doubled, lengthening the life and increasing the efficiency of Army boiler plants.

Coal analysis.—While coal sampling for Government purchases continued on an expanded scale, the Bureau's work in coal analysis likewise increased tremendously because of the coal-dust samples submitted by coal-mine inspectors in their work of promoting health and safety in the Nation's mines. More than 10,000 of these samples were analyzed.

Coke studies.—With the Nation's wartime steel-production schedules calling for more metallurgical-grade coke, the Bureau sent a mobile laboratory into the beehive field to provide operators with technical data that were essential in the production of better-grade coke of uniform quality. The Bureau's work in fostering the output of cleaner coal and adoption of improved coke-plant practices probably helped prevent the closing of some war plants running short of suitable metallurgical coke. A scarcity of petroleum coke led the Bureau to develop a method for producing, from low-ash coals, electrode carbon suitable for use in aluminum plants.

Coal storage.—To insure sufficient supplies of coal, industry began storing larger amounts in off-peak periods. Many of the storage and procurement problems that arose were solved through the help of the Bureau. Information was supplied regarding the best methods of storing particular coals to avoid spontaneous combustion and other hazards which cause loss. Special assistance was provided operators of docks in the Great Lakes area in preventing deterioration and possible loss in more than 50,000,000 tons of stored coal. Other Bureau experts tested the efficiency of various materials for excluding air from subbituminous coal stored for use by the Army and Navy.

Colloidal fuel.—In cooperation with an oil company, a method was developed for making colloidal fuel—a mixture of pulverized coal and oil—to relieve fuel-oil shortages created by the war. Tests in commercial plants proved this fuel can be employed satisfactorily with reasonable attention to maintenance of proper conditions.

Liquid fuels from coal.—The continuing decline in the discovery of new oil pools in the United States, heavier wartime consumption of natural petroleum, and transportation difficulties threw greater

emphasis on the Bureau's research in producing synthetic liquid fuels from coal. Earlier tests on 14 American coals, including lignite, subbituminous, and high-volatile bituminous types, proved that fuel oil, Diesel oil, motor gasoline, and aviation gasoline can be obtained from them by hydrogenation.

Experiments progressed in the operation of the laboratory-scale pilot plant for the direct hydrogenation of coal, and laboratory-scale investigations were begun on the indirect process for making synthetic gasoline from water gas derived from coal. While two members of the Bureau's staff visited coal-liquefaction plants and research laboratories in England, a measure was introduced in Congress proposing the construction and operation of demonstration-size plants by the Bureau to pave the way for ultimate commercial production by private industry of liquid fuels from coal, oil shales, and other materials.

Fuel conservation.—The progress made in determining the causes of corrosion of boiler-furnace wall tubes resulted in means of preventing further loss of steaming capacities in electric power plants. Cooperating with the Solid Fuels Administration for War, municipal authorities, trade and manufacturing associations, engineering societies, real estate boards, publishers, and other interested groups, the Bureau of Mines participated in a fuel efficiency campaign to conserve supplies of gaseous, liquid, and solid fuels for the war. Programs of this nature in certain Government plants already have resulted in fuel savings ranging from 9 to 20 percent.

Safety and efficiency.—To conserve electricity, Bureau engineers issued findings describing how the use of electricity can be cut down in coal mines. Other tests indicated that rock dust, used to minimize explosion hazards in coal mines, does not hasten the decay of mine timbers. In minimizing hazards in war industries, research workers determined the explosibility of various dusts and safer methods for their control.

Petroleum and Natural Gas

As the growing power of the United Nations' fighting strength increased the demands for special lubricants, liquid fuels, and the wide variety of petroleum byproducts necessary for maintaining supremacy of the land, sea, and air, the Bureau of Mines enlarged its schedule of technical research to assist the petroleum and natural-gas industries in meeting wartime production goals.

Special projects were begun to inventory crude oil for war needs, to apply improved methods for producing petroleum, and to determine new and additional sources of petroleum products. Throughout the year, war agencies and industry drew heavily from the

Bureau's fund of technical information on various crude oils, condensates, and natural gasoline, making possible the more efficient blending of aviation gasoline and the manufacture of toluene and benzene from petroleum in large quantities.

The engineers studied deep, high-pressure fields of the condensate type and prepared reports on four important fields in the Gulf coast for the Petroleum Administration for War which permitted PAW and the operators to develop programs for producing the optimum amounts of liquid hydrocarbons and at the same time prolonging the life of the fields.

A mobile field laboratory was built by the Bureau to determine the composition and phase relations of reservoir fluids—information which was necessary in developing operating plans which will leave minimum quantities of liquefiable products in the sands. Several months of field testing and study were devoted to a complicated natural-gas reservoir in Oklahoma supplying war industries. The Bureau's continuing study of the effect of well spacing on the quantity of extractable oil grew in importance because of the scarcity of steel for drilling new wells.

Engineering reports were prepared on an analysis of the oil-producing history of the Mexia-Powell fault-line fields of Texas, studies of Rodessa field in Louisiana, Texas, and Arkansas, and reservoir conditions of the Magnolia field in Arkansas. Reservoir fluids were analyzed to assist operators in the Cut Bank field of Montana in determining optimum production rates.

Water flooding and air- and gas-repressuring methods, employed to increase the extractable oil with a minimum use of material and labor, were studied and reports were issued on water flooding in Oklahoma and on brine-disposal systems in western Kansas. Bureau technicians ascertained that salt water produced with oil can be conditioned and used as a repressuring medium in several areas.

To assist the 15,000 oil producers in the Appalachian region, the Bureau established a petroleum field office at Franklin, Pa., in April 1942, and this office reported during the fiscal year on nine air- and gas-injection projects in widely separated parts of the Appalachian region and on the cost of reconditioning wells to guide further efforts in stimulating the production of paraffinic oils needed for aircraft lubricants.

A chemical engineering study of the proper blending of oil-base drilling fluids suggested that they may prove extremely valuable in increasing the supplies of recoverable crude oil. The Bureau also published a report on the tools and techniques employed in rehabili-

tating wells which require the removal of sand, mud, and other obstructions.

Research work on aviation gasoline was expanded to include both natural and synthetic components, and exacting analyses were made on crude oils, condensates, and natural gasolines to find new sources of aviation gasoline, toluene, and benzine. Several crude oils were analyzed by superfraction action and 17 naphthas from high-sulfur crude oils were desulfurized and tested for octane rating and tetra-ethyl lead response. Other research continued in the analysis of asphaltic materials, and plans were laid for constructing an experimental plant to recover microcrystalline wax from waste for munitions and other war uses.

During the year 132 special reports were prepared on properties of materials available from particular crude oils and distillates for war uses. The Bureau also resumed its semiannual survey of motor gasoline. At the request of the PAW, work was begun on the thermodynamics of hydrocarbons and derivatives primarily as an aid to the synthetic rubber program.

Helium

Meeting greatly increased demands for helium for the Navy's anti-submarine blimps, for meteorological balloons of the Army, Navy, and Weather Bureau, and for Army barrage balloons, the Bureau of Mines completed its new helium plant in Texas, modified and supplemented the equipment of its Amarillo plant in Texas and rushed construction of three other helium plants. Production of this lightweight, noninflammable gas was increased to about 25 times that of pre-war days and was meeting the current requirements for military and civilian uses. Additional wells were drilled in the famed Cliff-side helium-bearing gas field of Texas. While the armed services used most of the helium, considerable quantities also were employed for medical purposes, in diving and caisson work, and in the welding of magnesium airplane parts.

Explosives

The experience of the Bureau of Mines in handling and testing explosive and inflammable materials used by the mineral industries provided an ideal background for the successful completion of important research for the War and Navy Department and other war agencies. While continuing their normal research in the causes and prevention of industrial fires and explosions, experts carried on investigative work under the Bureau-administered Federal Explosives Act, working

closely with representatives of the armed forces, particularly the Safety and Security Branch of Army Ordnance, which named several Bureau men to technical boards and committees.

Certain new types of ammunition were analyzed for the Ammunition Development Branch of Army Ordnance, and other studies were made in the handling of explosives and pyrotechnics. At the request of the Army Engineer Board, all available military high explosives were examined to determine physical characteristics important to demolition work. Such tests included rates of detonation and the action of humidity and subsurface moisture at extreme ranges of temperature. Other studies involving explosives were conducted for the Navy Department, the Bureau of Standards, and the Board of Economic Warfare.

Typical problems of a confidential nature concerned the action and construction of seized enemy military devices and the clearing of land mine areas. New methods for testing explosives were devised at the request of military authorities.

Despite the increased volume of war work, technical experts made consistent gains in obtaining data regarding commercial explosives. In this field of activity 149 chemical analyses were made, 967 gallery tests were completed, and 2,248 control tests of a physical nature were conducted. At the close of the fiscal year, 180 explosives were on the Bureau's permissible list as being safer to use in mines. Also specifications were developed for Diesel engines that may be operated safely in mines and in other confined spaces, such as ordnance plants and synthetic rubber plants where inflammable atmospheres may be encountered.

Gas- and dust-explosion research.—Other services for war industries and agencies included determinations of the inflammability characteristics of gases and metallic and nonmetallic dusts. Considerable study was devoted to the prevention of explosions involving butadiene, a principal constituent in the manufacture of synthetic rubber. The dusts of aluminum, antimony, cadmium, chromium, copper, magnesium, tin, zinc, and other war metals were tested and industries were advised regarding precautionary measures which should govern their handling.

SAFETY, PLANT PROTECTION, AND HEALTH ACTIVITIES

Loss of skilled manpower in the mineral industries, equipment shortages, and the plea by war agencies for increased production, formed the backdrop for greatly expanded safety and security programs executed by the Bureau of Mines. Safety education, accident-prevention work, investigative activities, and testing of materials

were aimed at the conservation of men and machinery. Despite increased production, additional man-hours of labor, and the employment of many inexperienced workers, the anticipated upward trend of accidents in the mineral industries was relatively small.

Under the Federal Coal Mine Inspection Act of 1941, inspectors visited a larger number of coal mines during the fiscal year in their duties of furthering health and safety in this vital field of production. Safer storage, handling, transportation and use of commercial explosives resulted from the Bureau's administration of the wartime Federal Explosives Act. Public and industrial security was enhanced as operators of mines, metallurgical plants, quarries, and similar plants responded to Bureau recommendations for means of preventing sabotage and subversive activities.

Safety Work

The experienced safety engineers of the Bureau performed valuable service in directing and assisting in the administration and field activities of coal-mine inspection, the explosives control program, and mineral production security activities. During 1943, engineers and safety instructors trained 45,952 employees of the mining and affiliated industries in first aid, and the total completing such courses under the Bureau's sponsorship reached 1,584,774. About 675 persons qualified as first-aid instructors, swelling the ranks of persons so trained to 16,500—a vital link in the program of civilian defense training. Forty-nine plants received certificates attesting to the training of all employees in first aid. Certificates were awarded 72 persons as qualified first-aid judges, and Bureau workers aided in conducting 42 first-aid contests in 8 States.

Basic mine rescue training, which has saved the lives of many industrial workers, was given to 2,498 mine workers; and 154 persons completed the advanced course. Because of their ability to use rescue equipment and their knowledge of rescue and recovery procedures in connection with fires, floods, and other disasters, these men can serve effectively in civilian defense work.

Bureau engineers investigated 41 mine explosions in 14 States, 30 mine fires in 16 States and Alaska, and 97 miscellaneous accidents in 26 States during 1943. They participated, in many instances with hazard to themselves, in rescue and recovery operations involving explosions, fires, and floods, and helped fight numerous mine fires.

At the request of the owners, careful inspections were made of 63 privately owned mine rescue stations. Meanwhile, accident-prevention training continued to grow in popularity, 566 persons enrolling

in these courses and bringing the number completing such instruction to 10,865 and those receiving partial training to 6,450.

Motion pictures, slides, exhibits, testing galleries, and other mediums were employed in the safety education program. Sound motion pictures on safety subjects were shown 208 times. Bureau representatives participated in 547 safety meetings in 33 States.

To determine the degree of safety afforded by electrical machinery and equipment for use in mines, the Bureau continued its special testing work on devices submitted by manufacturers. Formal approvals covering 35 complete machines were issued and 19 formal letters of suitability were granted covering individual parts, together with 48 extensions of letters of suitability for safe use against gas and dust ignitions. The Bureau also made 589 explosion tests for the Navy of explosion-proof enclosures intended for ships.

Coal-Mine Inspection

The numerous safety improvements made voluntarily by officials and workers in coal mines were among the concrete results of the Federal coal-mine inspection program. Lower accident rates in many mines in spite of increased output due to the war and the receipt of many letters from both company spokesmen and workers' organizations commending the manner in which Bureau of Mines representatives conducted the investigations attested to the success of the inspection work.

During the fiscal year, Federal inspectors visited 1,149 coal mines in 22 States and Alaska, representing a combined annual production of 293,218,266 tons, or 46 percent of the total annual 1942 coal production. These mines employed a total of 233,160 men. Since Federal inspections began on December 1, 1941, 62 percent of the coal mines employing more than 25 persons each have been inspected; these mines employ 66 percent of the workers.

Recommendations designed to increase safety and promote healthful conditions were made by the Federal representatives and mines were credited for existing safeguards and for improvements effected subsequent to the inspector's visits. State mine-inspection departments cooperated with the Bureau by requiring compliance with State mining regulations and urging adoption of many suggested safety measures not included in State statutes, but recommended in Federal inspection reports.

Ventilating improvements made as a result of Bureau of Mines inspections have, the Bureau believes, prevented some mine explosions. Very few companies disregarded the Federal recommendations or

deliberately delayed in carrying out certain improvements; there were several mine explosions and other accidents in mines which, in the opinion of the Bureau, would not have occurred had Federal suggestions been followed.

Special investigations regarding explosives and electrical equipment in mines were made by mining-explosives engineers and mining-electrical engineers of the inspection staff and other special studies of mine hazards and problems were undertaken by coal-mine inspectors.

Explosives Regulation

Guarding against sabotage and misuse of the hundreds of millions of pounds of explosives used annually in the United States in commercial operations, the Bureau of Mines tightened its surveillance over the manufacture, purchase, sale, storage, use, and possession of non-military explosives and their ingredients as authorized under the Federal Explosives Act. By a system of licensing, Federal control of explosives was maintained from the manufacturer to the lawful consumer. Fifty-two explosives investigators were stationed in various States and Alaska to supervise and guide the 4,500 Federal licensing agents and to investigate the handling, storage, and use of explosives. The licensing agents, who serve without pay except for the 25-cent fee they are entitled to collect from each person to whom they deliver a license, issued about 350,000 licenses to vendors, purchasers, and foremen during the year. The Bureau examined and acted upon 4,000 additional applications from manufacturers, schools and colleges, and laboratories.

Investigative work under the Federal Explosives Act was woven closely with the safety and security programs of the Bureau. Investigators made reports on more than 9,000 stores of explosives and were assisted by other engineers and technicians of the Bureau of investigating fires and explosions in mines, quarries, munitions plants, and factories manufacturing fireworks for military and industrial purposes.

In carrying out its duties under the Federal Explosives Act, the Bureau maintained liaison with the Army and Navy Intelligence services, the Office of Civilian Defense, and the Office of the Chief of Ordnance of the Provost Marshal General.

Antisabotage

Strengthening home-front production and supply plants against losses due to sabotage, subversive activities, injuries to workers, fires, floods, and other eventualities, the Bureau of Mines sent a corps

of specially trained engineers into 1,968 mines and related facilities during 1943 under the facility security program.

At the request of the Provost Marshal General's office, the Bureau of Mines assisted in the inspection of mineral facilities and undertook inspections for the security status of surface and underground workings of all mines, including those on the Army's master responsibility list. Joint inspections were made by Army officials and Bureau engineers, and recommendations were jointly approved by the War Department and the Bureau before they were transmitted to the operators. Bureau engineers acted for the War Department in making recurring inspections of mines and related facilities on the Army's list and submitted reinspection reports to Service Command headquarters.

In addition to the many original inspections made during the year, the Bureau's small field staff of 65 engineers assigned to mineral-production security work made 132 reinspections to check improvements made since the initial inspections. Reports received by the Bureau indicate that these inspections resulted in the adoption of many precautionary measures to prevent sabotage and subversive activities and curb accidents.

Mineral-production security inspectors, as well as Federal coal-mine inspectors and other field workers of the Bureau, because of their familiarity with mines in all parts of the country, assisted in the scrap-metal drive by locating scrap material in abandoned and active mines and by helping in its recovery or rehabilitation.

Health in the Mineral Industries

Increased production of essential war materials by preventing occupational diseases and improving the efficiency and morale of the workers through better environment was emphasized by the Bureau during the year.

Inspections were made of the hygienic aspects of working conditions in anthracite mines and zinc, manganese, and ordnance plants, and suggestions were made for eliminating or controlling hazards. Several investigations were made at the request of the Navy Department regarding health and safety aspects connected with certain of its operations.

The field investigations and studies made by other Bureau engineers required the analysis of approximately 12,000 air samples, compared with 5,300 in 1942. About 400 dust samples also were tested. Approximately 10,000 air samples were analyzed for Federal coal-mine inspectors and other field workers. Five hundred air samples were analyzed for the Army and Navy, and 1,500 samples were tested

as part of the research work regarding the safety of electrical mining equipment, respiratory protective devices, and similar equipment. Dust samples were tested as part of the health and safety surveys in mines, studies in explosives and coal hydrogenation, and in aiding research work conducted by the Army.

The protection of workers against noxious gases, fumes, and dust grew increasingly important as a wartime health measure, and demands for Bureau-approved respirators increased along with requests for suggestions regarding their correct use and care. Such requests came from various mines, labor organizations, ordnance plants, the Maritime Commission, and others concerned with war production. Special tests also were made by the Bureau for the armed forces and the Maritime Commission to obtain certain information regarding respirators.

ECONOMICS OF MINERAL INDUSTRIES

Since dwindling margins between wartime requirements and domestic production of many of the leading mineral commodities during 1943 required closer control of their distribution and uses, there were steadily increasing demands on the Bureau of Mines for comprehensive statistical and economic information to guide those charged with maintaining adequate supplies of mineral products.

Both the volume and frequency of the information surveys handled by Bureau experts climbed to new levels, many special studies were undertaken, new services were inaugurated, and scores of conferences were held to provide executive legislative branches of the Federal Government with factual data.

Partly because of the unusually heavy pressure of war activities and the necessity of maintaining secrecy regarding sources, production, reserves, and uses of many commodities, publication of the 1941 Minerals Yearbook was delayed. This authoritative publication included 14 chapters on critical and essential minerals which could not be released for general distribution and the Yearbook thus was issued as a confidential document for the use of a limited number of Federal officials. Certain other chapters containing important data, but not considered in the category of being of "aid and comfort to the enemy," were distributed after deletion of certain tables and other confidential material.

Metals

Continued expansion of plant facilities and the resulting accelerated tempo of production placed a heavy strain on the Nation's supply of metals. The supply of such metals as aluminum, cadmium,

tin, magnesium, copper, zinc, molybdenum, nickel, vanadium, tungsten, and chromium was insufficient for both war and civilian demands. The Bureau conducted monthly or quarterly surveys of these materials and more than a score of other commodities, and in many instances this information was utilized by the War Production Board in determining its allocation systems.

In 1942 many additional studies in metal production and consumption were undertaken, and this trend continued upward during 1943 as war agencies, particularly the WPB, called for up-to-date confidential data on a larger scale.

During the year, 415 confidential reports were distributed to war agencies and 35 nonconfidential reports were released to industry. New monthly or quarterly reports were undertaken on cobalt, iron ore, selenium, tellurium, vanadium, zirconium, lead and tin scrap, and zinc scrap. In addition, 26 chapters were prepared for the Minerals Yearbook.

Monthly reports giving the mine production of copper, lead, and zinc by individual workings were employed by the joint War Production Board-Office of Price Administration Quota Committee in forming bases for control and were used extensively by other war agencies. In conjunction with Bureau of Labor Statistics reports on mine employment, the Bureau of Mines information was used by the War Manpower Commission and other agencies in mine labor and productivity problems. The series of monthly reports for the production of copper, lead, and zinc by States was extended to include gold and silver. Field offices of the Bureau assigned to the compilation and interpretation of mineral production information served in an advisory capacity to other Federal agencies concerned with mining problems, particularly in the Central and Western States. In addition, Minerals Yearbook chapters on the production of gold, silver, copper, lead, and zinc were prepared.

Accident and Health Data

Requests from agencies of the Federal Government and various non-Federal offices for facts regarding accidents and production in mines were used in programs involving the protection of plant facilities, the placement of prisoners of war, and the distribution and utilization of manpower for maximum benefit to war-production schedules.

To reduce the number of reports from industry and to promote uniformity of basic information concerning accidents in coal mines, conferences were held with State mining officials and State compen-

sation and industrial commissions regarding the merits of a standard report form. This form was suggested for companies providing accident information to States and to the Bureau of Mines. Through the cooperation of the National Coal Association and State associations of coal companies, the conference resulted in the adoption of a single standard report form by States producing 85 percent of the Nation's coal. The Bureau began a preliminary survey to obtain accident data in the petroleum industry. Other informational services included the annual production, consumption, and distribution of commercial explosives and the estimated quantities of nitroglycerin and other ingredients used in the manufacture of blasting materials.

NONMETALLICS

The Bureau of Mines conducted 18 surveys in the nonmetallic industries during 1943, many of them being undertaken at the specific request of officials in other agencies of the Government. Typical of these were facts regarding the availability of mica for airplane spark plugs, asbestos for fireproof wire coverings, magnesia for refractories, cement for airfield runways, gypsum for military housing, mineral pigments for camouflage paints, and celestite for tracer bullets and flares.

From the Bureau's storehouse of information came answers to the approximately 500 inquiries received each month. Data files, started a quarter of a century ago and augmented each year by the addition of from 4,000 to 5,000 new items, supplied basic information which led to the solution of many war problems.

Research workers prepared 21 chapters for the Minerals Yearbook and compiled 48 other publications regarding nonmetallics, 10 of which concerned such vital subjects as furnace refractories, strategic mica, kyanite, lithium, mineral pigments, olivine, a review of mineral progress, and home insulation with minerals to promote the conservation of fuels. Studies were begun regarding cement developments in Latin America and the functions of corundum, vermiculite, and minor fertilizer materials in the military program.

Mineral Trade Notes, comprising abstracts of consular reports and special contributions primarily concerning foreign mineral developments, was prepared monthly for the confidential use of certain war agencies.

Petroleum and Natural Gas

Gasoline and fuel-oil rationing, transportation changes, and ever-rising war needs for petroleum products multiplied the difficulties

of the Bureau of Mines in forecasting demands for motor fuel and crude petroleum, but monthly reports were continued successfully and the cumulative forecasts showed an approximate divergence of only 1 percent from actual demand.

While the preparation of regularly supplied information proved extremely useful to war agencies, special studies also were requested for certain supplemental material regarding petroleum and natural gas and these surveys were undertaken immediately by the Bureau. Outstanding among the regular services was the survey on the production, stocks, and demand for aviation gasoline. Bureau statistics were combined with those from other sources to maintain a complete check on the trends of supply and consumption in the critical Atlantic and Pacific coast areas. Information was obtained in the field of international petroleum trade for agencies concerned with export control and demand.

Anthracite and Coke

Expanding its work in collecting facts regarding the anthracite and coke industries, the Bureau of Mines provided currently an over-all picture which enabled war agencies to keep abreast of economic and technical developments in the solid fuels field, to control prices, and to manage efficiently the distribution of supplies to war plants and civilian users. Information was provided the War and Navy Departments on international fuel, power resources, and production.

Surveys covering the consumption of foundry coke, classification of contract tonnages of merchant byproduct-coke plants, production of coke and byproducts at coal-gas retort plants, and sources of coking coal for byproduct and beehive plants were completed at the request of the Solid Fuels Administration for War and the Bureau began a study of the distribution of Pennsylvania anthracite at the retail dealer level for the 1942-43 coal year. Confidential industry surveys for coke, coke byproducts, and Pennsylvania anthracite were compiled monthly. Annual reviews covering developments in the byproduct and beehive coke, Pennsylvania anthracite, lignite, peat, fuel briquets and packaged-fuel industries were prepared for the Minerals Yearbook and summaries of these chapters, with confidential material deleted, were issued for general distribution.

Data on Foreign Minerals

Through arrangements with the Department of State and the Board of Economic Warfare the Bureau of Mines was given the responsi-

bility of the technical direction of mineral attachés and the publication for Government use only of economic facts regarding mining conditions in foreign countries. On recommendations of the Bureau, mineral attachés were appointed to American embassies in Cuba, Mexico, Peru, and Bolivia. Similar assignments are contemplated for Brazil, Argentina, Chile, and certain countries outside the Western Hemisphere. During the year, detailed reports were prepared by the Bureau regarding mineral resources of Peru, North Africa, and Turkey and similar information was assembled regarding British West Africa and French West Africa.

PUBLIC REPORTS

All publications not compatible with the prosecution of the war were eliminated during the fiscal year and general distribution of the Minerals Yearbook was discontinued. Economies also were effected by distributing abstracts of many reports in place of the full publication. Few press releases were distributed.

Because of the heavy demand for statistical data and other informative material regarding all phases of the mineral industries, the Bureau issued a series of confidential reports for restricted distribution among war agencies and certain producers of war minerals. Some chapters of the Minerals Yearbook—with all confidential information deleted—were released to persons and industries requesting such publications.

In all, 551 bulletins, technical papers, handbooks, Minerals Yearbook chapters, and contributions to technical journals were prepared.

The Bureau's Washington library of selected reference material was increased by 2,732 books; 247 periodicals, many on an exchange basis, were received regularly, and 24,471 publications were circulated for use outside the library. Many thousands of letters were written in response to requests from the public for information concerning the mineral industries.

The Bureau's free educational motion pictures, produced in co-operation with industry with production costs paid for by private industry, were in constant demand by the Army, the Navy, and the Office of Civilian Defense for use in war-training programs. They also were shown in South American republics, Canada, China, South Africa, and Great Britain. During 1943 the Bureau's films were shown on 95,876 occasions to audiences totaling 7,928,201 persons. Since 1922, the Bureau's films have been shown on 957,936 occasions and the audiences have totaled 103,584,650.

ADMINISTRATION

To handle more effectively the larger volume of administrative work, the Bureau reorganized its administrative branch, establishing an administrative officer and two assistants, one in charge of an Office of Business Management and the other in charge of budgetary matters. As in past years, the Bureau's activities were administered from Washington, D. C., but were carried on mainly in the field offices, laboratories, and pilot plants.

Personnel

On June 30, 1943, there were 3,851 full-time employees of the Bureau of Mines, distributed as follows:

	Dept.	Field	Total
General administration.....	191	56	247
Operating services.....	181	3,119	3,300
Economics and statistics service.....	129	175	304
Total.....	501	3,350	3,851

¹ Including field employees as follows: Hellum plants 269; Eastern Region, 519; Central Region, 386; Western Region, 962.

Property

The records as of June 30, 1943, show that the property of the Bureau had a total valuation of \$6,908,426.77, of which \$2,531,187.35 was for land, buildings, and improvements; \$1,242,280.85 for laboratory equipment; \$901,597.44 for machinery and power-plant equipment; and the remainder for certain helium properties, office furniture, automobiles, and other goods. The property of former Albany College, at Albany, Oreg., was purchased, under congressional authorization, for the establishment of a Northwest Electrodevelopment Laboratory.

Finance

The total funds available to the Bureau of Mines for the fiscal year ended June 30, 1943, including direct appropriations, departmental allotments, reappropriated balances, and sums transferred from other departments for service work, were \$32,178,548.44. Of this amount \$26,034,197.82 was spent, leaving an unexpended balance of \$6,144,350.62. On the regular work of the Bureau, \$24,708,880.38 was expended. These figures are subject to revision because of unpaid obligations.

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Table 1 presents classified information regarding the financial history of the Bureau for the fiscal years ended June 30, 1941-44.

Table 2 gives a statement of the distribution of congressional appropriations to the branches and divisions and the expenditure of these funds in 1943 by Bureau divisions.

TABLE 1.—Bureau of Mines appropriations and expenditures, fiscal years ended June 30, 1941-44

Fiscal year	Appropriated to Bureau of Mines	Departmental allotments ¹	Funds transferred from other departments ²	Total funds available for expenditure	Unexpended balances	Total expenditures	Expenditures, exclusive of service items ³
1941.....	\$3,944,400.95	\$91,790.00	\$2,225,939.10	\$6,262,130.05	\$1,069,298.98	\$5,192,831.07	\$4,934,951.05
1942.....	8,910,388.68	97,490.00	2,223,026.41	11,230,905.09	1,821,358.28	9,409,546.81	8,749,668.24
1943.....	28,707,630.94	106,450.00	3,364,467.50	32,178,548.44	6,114,350.62	25,034,197.82	24,708,880.38
1944.....	20,693,252.56	89,500.00	2,740,770.00	23,523,522.56	-----	-----	-----

¹ Includes printing and binding, stationery, and contingent funds.

² Includes proceeds from sales of residue gas.

³ Service items include Government fuel yards, helium, and other investigations and services for other departments.

⁴ Includes \$6,539.10 unexpended balance reappropriated, and balance of \$85,452.95 receipts from sale of helium and other products.

⁵ Includes \$914,718.39 unexpended balance reappropriated, and balance of \$79,002.28 receipts from sale of helium and other products.

⁶ Includes \$372,486.29 unexpended balance reappropriated, and balance of \$128,918.51 receipts from sale of helium and other products.

⁷ Includes \$4,523,377.56 unexpended balance reappropriated, and balance of \$202,723.66 receipts from sale of helium and other products.

TABLE 2.—Bureau of Mines expenditures, fiscal year 1943

Branch or division	General expenses	Operating rescue cars and stations and investigation of accidents	Coal-mine inspections and investigations	Testing fuel	Experiments for synthesis of motor fuel, Pittsburgh, Pa.	Mineral mining investigations	Oil and gas investigations	Expenses mining experiment stations	Care, etc., buildings and grounds, Pittsburgh, Pa.	Economies of mineral industries	Investigation of domestic sources of mineral supply	Investigation of raw materials for western steel production	Construction and equipment of electro-develop-ment laboratory
Office of the Director	\$23,960	\$214				\$577		\$1,183		\$366	\$12,806		
Office of Minerals Reports	240	9,586	\$21,446	\$14,422	12,170	13,029	\$349	12,170		396	12,806	\$74	
Total	24,200	9,800	21,446	14,422		13,606	349	13,353				74	
Administrative Service	41,056	19,100	14,788	333		132	5,891	4,033		17,253	6,892	11,067	\$1,255
Resources and Planning Service						29,596		12,410		33,354	33,354	2,383	
Central Region						9,954		46,468			72,566		
Western Region		38,907	10,088	16,436		107,779		280,894	\$112,086		105,435	78,202	
Fuels and Explosives Service						189,971		200,122			392,607	206,702	186,581
Fuels Division	111,224		14,049	319,319	\$83,973				5,632			2,907	
Explosives Division	72,325												
Petroleum and Natural Gas Division							437,896		5,632			2,907	
Total	183,549		14,049	319,319	83,973		437,896						
Economics and Statistics Service													
Coal Economics Division										41,921			
Foreign Minerals Division										10,071			
Metal Economics Division										101,380			
Mineral Production and Statistics Division										135,238			
Nonmetals Economics Division			17,322							76,822			
Petroleum Economics Division										63,019			
Total			17,322							434,361			
Health and Safety Service													
Coal-Mine Inspection Division			577,325										
Safety Division		390,824	5,938										
Health Division		55,631	61,846										
Mineral Protection Division													
Explosives Control Division													
Total		446,455	639,169										
Total appropriations	68,765	700,040	768,000	356,205	85,000	390,745	449,100	571,795	125,300	455,330	681,265	349,325	500,000
Total expenditures	65,246	697,811	712,802	350,510	83,973	351,040	444,136	537,276	117,718	452,010	623,724	301,345	157,836
Balances	3,509	12,129	55,198	5,695	1,027	39,705	4,964	34,519	7,582	3,320	57,541	47,980	342,164

TABLE 2. — Bureau of Mines expenditures, fiscal year 1943—Continued

Branch or division	Gaseous and solid fuel reduction of iron ores	Construction and equipment of helium plants	Manganese beneficiation pilot plants	Production of alumina from low-grade bauxite and aluminate	Investigation of bauxite and aluminate deposits	Beneficiation of chromite and production of electrolytic chromium	Magnetization of pilot plants and research	Investigation of deposits of critical and essential minerals in the U. S. and its possessions	Helium production	Reduction of zinc concentrates with meth- ane gas	Salaries and expenses, enforcement of Federal Explosives Act	Development and operation of helium properties (special fund)
Office of the Director	\$231				\$1,707			\$4,907				
Office of Minerals Reports	227	\$324	\$4,182	\$1,073	7,850		\$159	12,276		\$25	\$10,063	
Total	458	324	4,182	1,073	9,557		156	17,183		25	10,063	
Administrative Service	7,393	30,337	19,803	20,839	12,054	\$1,526	12,313	46,049	\$5,962	5,545	46,446	\$48
Resources and Planning Service	412				5,538			69,503	3,089			
Central Region	55,187		15,375	79,792	662,896		132,168	421,762	98,941			
Eastern Region	79,606			491,315	241,074			533,694			1,944	
Western Region	424,481		1,409,990	125,390	148,330	64,230	383,941	982,885				
Fuels and Explosives Service												
Fuels Division												
Explosives Division												
Petroleum and Natural Gas Division		11,735,505							366,575		74,673	
Total		11,735,505							366,575		74,673	12,886
Economics and Statistics Service												
Coal Economics Division												
Foreign Minerals Division												
Metal Economics Division												
Mineral Production and Statistics Division												
Nonmetals Economics Division											242	
Petroleum Economics Division												
Total											242	
Health and Safety Service												
Coal-Mine Inspection Division												
Safety Division												
Health Division											916	
Mineral Protection Division												
Explosives Control Division												
Total											363,678	
Total appropriations	600,000	15,160,000	1,577,570	742,875	1,101,404	75,000	600,825	2,167,500	1,502,081		354,594	215,658
Total expenditures	567,837	11,766,166	1,509,350	718,409	1,070,449	65,756	538,581	2,071,076	372,587		540,000	215,658
Balances	32,463	13,363,834	68,220	24,466	21,955	9,244	71,244	96,424	1,129,544	242,400	52,088	1,202,724

Geological Survey

W. E. WRATHER, Director

SUCCESSFUL conduct of the war is today the first duty of this Nation. American soil must be guarded against further conflict, and victory on foreign shores must and will be won.

For these purposes, our armed forces must have a ceaseless supply of weapons, munitions, and fighting and transport vehicles—a supply that can be kept up only by adequate sources and production of many metals and minerals. Furthermore, they must have ample supplies of water for all plants that are making war implements or furnishing power for their production, for military and naval installations, and for troops at the front. Finally, military leaders must have accurate maps and other information about the lands in which fighting is or will be in progress.

The Geological Survey is devoting its every effort toward meeting those imperative needs. Its trained personnel, its techniques, and its 60-year store of information are directed intensively to war problems. By investigating and reporting on ore deposits in this country and Latin America it contributes largely to an adequate supply of minerals for war purposes. By many special studies, supplementing its accumulated information on the surface and underground water resources of this country, it is rendering to the armed forces and to war industries thousands of helpful reports on available water supplies. It is preparing maps of great areas of strategic importance in this country and abroad and is making for the armed forces many special reports on foreign lands—their terrain, water supplies, building materials, and other features affecting military operations. During the fiscal year ended June 30, 1943, with augmented funds and personnel, all these tasks were carried forward with intensified vigor; the work accomplished is set forth in detail in the pages that follow.

Despite its concentration on wartime tasks, the Geological Survey has not lost sight of the fact that the results being obtained will be

invaluable also for many peacetime uses. Great tasks lie ahead. Under the dire necessities of war and the will to win, this Nation is pouring out its wealth of manpower and resources without stint or hesitation. When victory is won and this country must undertake its share in rebuilding a war-torn world, it will face problems no less grave and baffling than those of armed struggle. It will face them shorn of much of its choicer mineral resources and must thereafter increasingly rely on inferior grades or on foreign supplies. To meet those aspects of the problem, the Nation must call upon the zeal and inspiration of its scientists, its engineers, and its technologists. The Geological Survey must do its part in those future tasks; and it is looking forward and planning ways in which that part can best be accomplished.

GEOLOGIC BRANCH

The rapidly expanding scale of war production has created an almost insatiable demand for mineral commodities, and this demand has increased until not only those materials hitherto classified as of strategic and critical importance are included but also a great number of other minerals and metals that either have been considered adequate in amount or in the past have been in relatively slight demand. The shortage of shipping tonnage caused attention to be focused more sharply than ever on domestic sources of these materials and on sources in the other American Republics. The Geologic Branch, with its experienced professional staff, was especially qualified to evaluate these sources and directed its activities almost exclusively to that task. Cooperation was carried on with several States and with Federal organizations, many of which transferred funds to the Survey for the undertaking of particular tasks. The Geologic Branch was thus placed fully on a war footing, acting as a fact-finding organization and as an adviser on mineral-production policies and on reserve problems. More than 700 reports on field examination of mineral deposits were made to the various Federal agencies, many of them at the direct request of those agencies.

WAR MINERALS

As the civilian economy of the country became more restricted during the year and a greater proportion of industry was converted to war work, practically all metals and minerals became war materials, and increased quantities of most of them were demanded. In order to coordinate the work of the Survey with that of the Bureau of Mines, regional offices were established in Salt Lake City, Utah, Spokane,

Wash., Rolla, Mo., and College Park, Md. Recommendations were made to the Bureau of Mines for exploration of many deposits, and necessary geologic information was provided for most of the projects actually undertaken by the Bureau. Although confidential reports for use by the war agencies and the Bureau of Mines constituted the bulk of the Survey's output during the year, 24 Strategic Minerals bulletins and 55 press memoranda were published making detailed mine maps available to interested operators.

Detailed records of the history, geology, mineralogy, reserves, and economic possibilities of essentially all known manganese deposits, mines, and prospects in the United States were completed. Studies of manganese were completed in California, eastern Tennessee, and the Batesville district, Arkansas, but were continued in active areas in 18 other States.

Studies of copper, lead, and zinc deposits were greatly expanded during the year. Attention was given both to minor districts that offered possibilities of increased production and to larger productive districts.

More than 100 chromite deposits in California, Montana, Oregon, and Georgia were studied, most of them in cooperation with Bureau of Mines exploratory programs. These studies were important factors in demonstrating the presence of sufficient reserves to justify the erection of mills that are now producing 90 percent or more of the domestic chrome.

More than 100 separate tungsten areas, including more than twice that number of individual deposits, were examined. This work was distributed over all of the Western States. Detailed studies and reviews were made of a number of the more promising districts.

Work was continued on domestic mercury deposits, and by the end of the year most of the important producing areas had been mapped in detail. These studies have already resulted in the discovery of new ore reserves, notably at New Idria, Calif., and they have yielded a working basis for exploration and development elsewhere.

Vanadium investigations were continued, particular attention being paid to the Colorado Plateau and Idaho-Wyoming deposits. Substantial progress was made in the estimation of ore reserves, and specific drilling programs in geologically favorable areas were initiated in cooperation with the Bureau of Mines and the war agencies.

A special survey of possible new sources of molybdenum, nickel, and cobalt was undertaken. Altogether, 40 or more deposits of these metals received some attention in all the Western States, as well as in Wisconsin, New Hampshire, North Carolina, Arkansas, and Maine.

During the year the domestic situation with regard to antimony, bismuth, and arsenic was reviewed, and special studies and examinations were carried out or begun on deposits of these metals.

The search for raw materials from which aluminum and magnesium may be extracted continued during the year. Alunite, magnesite, and dolomite deposits in the Western States, bauxite and high-alumina clays in both the West and East were examined and reserves were estimated. Deposits of talc, graphite, and strontium ores were studied.

General and detailed examinations of pegmatite deposits containing sheet mica, feldspar, beryllium, tantalum, and lithium were made in Maine, New Hampshire, Massachusetts, Connecticut, Virginia, North Carolina, Georgia, Alabama, South Dakota, Colorado, New Mexico, Arizona, Nevada, California, Idaho, and Washington. The pegmatite deposits of New England and the southern Black Hills were studied with a view toward composite mining of the pegmatite minerals.

Quartz crystals have been used for many years in radio communication, but until recently the quantity needed was only a few tons a year, for which the United States was chiefly dependent upon imports from Brazil. In view of the greatly increased demand for radio equipment to meet war requirements, the Geological Survey has undertaken a search for domestic deposits of quartz of oscillator quality in various parts of the country, particularly in Arkansas and in the Southeastern and Western States. Results to date indicate that a modest supply of quartz of fine quality can be developed in Arkansas.

To meet the growing needs of the steel industry, work was focused on projects of special interest to war agencies to help relieve the critical situation in iron-ore supplies, particular attention being paid to finding readily accessible reserves of direct-shipping lump ores of low phosphorus content. Examinations were made of deposits in 22 States throughout the country.

Bauxite districts in Arkansas, Tennessee, Mississippi, Alabama, and Georgia were mapped in detail. Many new deposits were discovered, and recommendations were made by the Geological Survey to the Bureau of Mines for the drilling of selected areas. In the Appalachian region no large deposits of commercial grade were found. In the Gulf Coastal Plain drilling was begun on four projects which, by the end of year, showed about 900,000 tons of new commercial ore. In Arkansas 20 areas were drilled, and it is estimated that at least $3\frac{1}{2}$ million tons of commercial ore has been found in addition to the previously known reserves. Although the current expanded program of exploration and mining is meeting the present demand, it should be

borne in mind that the Nation's reserves of metallurgical bauxite will be exhausted within a few years if the present rate of production is maintained. The Geological Survey is therefore continuing its investigations of high-alumina clays in the hope that a satisfactory process for extracting alumina from them will be perfected. The Survey is also extending its search for bauxite into the West Indies in cooperation with the State Department.

Because of the increased need for fluorspar in the steel, aluminum, and chemical industries, the Geological Survey renewed the search for domestic deposits. Detailed geologic mapping was completed in many localities, and recommendations for drilling and other exploratory work were made to the Bureau of Mines and to owners or lessees of properties. Additional fluorspar reserves have been found in the Kentucky-Illinois field and in Colorado, New Mexico, Utah, and other Western States. The results of a more extensive program of investigation carried on in cooperation with various States, particularly Illinois, Texas, and Idaho, are being made available through the Geological Survey to the several war agencies.

Geologic studies of mineral fuels included the search for additional deposits of coking coal suitable for western steel plants and studies of areas that give promise of promptly yielding additional supplies of oil. At the request of the Petroleum Administrator for War, the oil and gas map of the United States was revised. A survey in cooperation with the Bureau of Mines provided information on additional resources of helium.

Close cooperation was maintained with several States, with the Geological Society of America, the Association of Petroleum Geologists, and the National Research Council on matters of fundamental research that would prove useful to the war program.

The Sections of Chemistry and Physics, Petrology, and Paleontology and Stratigraphy were mainly occupied in analyzing and classifying materials sent in by the field geologists. The chemical laboratory, in addition to identifying or analyzing more than 8,000 samples, developed new methods of analysis for a large number of elements, many of which occur only as minor constituents of the samples. The Section of Petrology gave special study to beryllium, tantalum, magnesium, tin, titanium, chromium, and other ores and minerals.

MILITARY GEOLOGY

During the year the Military Geology unit was established to meet the increasing demands of the War and Navy Departments for geologic information on strategic foreign areas as related to engineering.

The work was based primarily on bibliographic research, though supplemental sources of information were made available by the agency requesting information. At the close of the year, the Military Geology unit had 30 geologists and operated in part on funds transferred from the Corps of Engineers through an interdepartmental agreement and in part on funds allotted from the appropriation for "Geologic Surveys."

AMERICAN REPUBLICS

The work of the Geological Survey in the American Republics during the fiscal year, largely sponsored by the Department of State, was integrated still more closely to war needs. Although the original purpose of promoting cordial relationships between the countries continued to be of first importance, the widening effects of the war upon all nations increased the interest in war resources. Close cooperation was begun between the Board of Economic Warfare and the Geological Survey in work financed by the Board in Colombia, Central America, and Brazil. Work was carried on in Brazil on nickel and mica; in Argentina on tungsten, beryl, and tantalum; in Colombia on quartz, mica, molybdenum, copper, and mercury; in Panama on manganese; in Central America on a large variety of minerals; in Cuba on manganese, chromite, copper, and zinc; in Venezuela on mica, quartz, and nickel; and in Mexico on tungsten, manganese, antimony, fluorspar, mercury, and molybdenum.

Exploration for tungsten in Mexico has already resulted in the discovery of a district that may become an active and significant producer, and an exploration for mercury in Mexico has resulted in a large increase of production in the largest producing district. Considerable reserves of chromite have been discovered in Cuba. Aluminum ores in a novel environment have recently been discovered in the Caribbean area, and a reconnaissance of that region is being vigorously prosecuted in the hope of finding other deposits of similar magnitude and grade.

ALASKAN BRANCH

The work of the Alaskan Branch during the past year has necessarily been focused on problems whose solution would contribute most directly to the Nation's supply of war materials. Obviously this aim must be stressed so long as the war lasts, if Alaska is to make its fullest contribution to the country's war needs. Although the particular emphasis to be placed on certain phases of this work may be somewhat altered after victory has been attained, this country must be

alert to prepare so that whether at peace or at war the search for Alaska deposits of the essential mineral commodities shall be carried on intensively.

The development of Alaska is becoming tied in with increasing intimacy to the welfare of the Nation as a whole. Never again can Alaska be left as a vulnerable outpost. To avoid such danger, as well as to derive benefit from this outlying possession, the country must become more thoroughly acquainted with Alaska, its resources must be inventoried and plans must be made to utilize and develop them wisely. Into such a broad forward-looking program the present war projects fit perfectly as an integral part. The current projects are designed to supply certain mineral materials quickly, without regard to the normal requirement of commercial profit. Ultimately the present limited list must be expanded to include all the essential mineral products needed for the support of the military and civilian population in the Territory or that are needed by the Nation as a whole. Scores of mineral commodities now supplied to Alaska only through imports must be developed locally. It is absurd, for instance, for Alaska to depend on securing supplies of cement for use in local construction from points thousands of miles distant when, presumably, equally satisfactory material may be developed much nearer at hand. Coal is another mineral resource that should be developed to supply at least all of Alaska's local needs.

Still more pressing is the need for testing the places in Alaska at which signs of petroleum are known, as waning supplies elsewhere indicate plainly that the known resources of this fuel cannot long withstand the present draft by civilian and military establishments. New reserves of oil must be found and made available—tasks that cannot be accomplished quickly or cheaply, especially in a remote region like Alaska. Scores of other commodities furnish equally impressive examples to prove that delay in finding out about all of our Alaskan mineral resources is unwise and harmful to the national interest. If essential supplies are to be available when needed it is urgent that these investigations be started at once and followed up with increasing diligence and intensity.

The maps now being prepared by the Alaskan Branch mainly for special military use are even more essential for civilian use in solving the countless problems that arise in the development of a pioneer country. Practically the first step in the consideration of any construction project is the close examination of all of the data afforded by adequate topographic maps, such as the Survey has been making in Alaska for the past 45 years. From these maps may be determined the accessibility of a project from nearby or remote settlements and

its general surroundings—streams and water features that may be advantageous or sources of danger, features of relief that may be utilized or may present obstacles to be overcome.

One of the most obvious uses of topographic maps is in planning and laying out a wisely chosen network of routes for travel by air, land, and water—matters that are becoming of prime importance in all military and civilian enterprises. Selection of the sites for reservoirs, ditches, or other means for supplying water to manufacturing centers or settlements requires intensive study of the natural topographic features of the areas to be served, and at least in the initial stages can be best done with the aid of accurate maps. At present less than half of the Territory has been surveyed with the degree of accuracy required for even the most general purposes, and less than one percent has been surveyed with the degree of detail that is considered essential for areas of only moderate development in the United States proper. This condition presents a real challenge to those charged with planning for the future.

The period of readjustment that necessarily ensues between the cessation of hostilities and the Nation's resumption of a peacetime footing is always difficult to bridge unless plans have been made in advance. Even then it is not easy usually to forecast the new trends that such reorganization may take. Little such uncertainty, however, dims the outlook for Alaska. It is a vast domain covering nearly 600,000 square miles—a fifth the size of the United States proper. Its population, aside from the military forces, is only about 70,000. As yet less than 5 percent of the land is privately owned. Under such conditions it seems elementary that the Government, as landlord, should quickly ascertain what it possesses, so that it may wisely administer its holdings for the benefit of all. Such a program would have especial merit if the Government found it necessary to provide employment for idle manpower during the period when peacetime activities are being resumed, as through it the services of many could be directed into useful channels.

Indicative of what the Survey has been doing to supply some of the hitherto lacking information regarding Alaska is the following résumé of the projects in which it recently has been engaged.

During the field season of 1942, which included the latter part of the fiscal year 1942 and the early part of the fiscal year 1943, the Alaskan Branch, through its regularly appropriated funds and a generous grant from the War Production Board, carried on 37 projects concerned with the examination of mineral localities, 2 topographic projects, and 1 general administrative project. Of the mineral investigations 6 were concerned with deposits of antimony ores,

5 with iron, 4 each with chromium, mercury, nickel-copper, and tin, 3 each with copper and molybdenum, 2 with tungsten, and 1 each with zinc and barium. The geographic distribution of these various specific projects by regions was as follows: 16 in southeastern Alaska, 5 in the Prince William Sound-Copper River region, 9 in the Cook Inlet-Alaska Railroad region, 3 in the Kuskokwim region, and 4 in the western Yukon-Seward Peninsula region. The 2 topographic projects that involved field work by the staff were reconnaissance surveys. One of these was the mapping of parts of the area adjacent to the Alaska Railroad west of Talkeetna and east of Seward, and the other was the mapping of parts of the western Yukon Valley that heretofore had not been adequately surveyed.

Although not involving field work by members of the Alaskan Branch, the compilation of aeronautical piloting maps from photographs furnished by the Army Air Forces and largely paid for from funds transferred by them to the Geological Survey became the principal office activity of the Branch, not only during the season of 1942 but throughout the fiscal year 1943 and is being continued at an accelerated rate with a greatly increased force. At the present time the services of more than 250 persons are being utilized in different steps of this project.

Another office task carried on uninterruptedly both in the season of 1942 and throughout the fiscal year 1943 is the collection of statistics regarding the output of all mineral products from Alaskan deposits. In this work a canvass of all the mining operators in the Territory is utilized as well as the services of the field force to contribute current information of value.

During the season of 1943, with the funds directly appropriated to the Geological Survey, as well as with those supplied by the War Production Board that were available up to June 30, 1943, the Branch had under way 6 general supervisory projects and 22 specific projects involving the search for needed war minerals. The 6 supervisory assignments, in addition to the task of maintaining administrative oversight of the various specific projects in the 5 principal Alaska mining regions, are designed to provide for keeping track of all mineral developments in each of the regions, so as to record current conditions and aid in preparing plans for any subsequent investigations that are required. Of the specific mineral projects, 6 are concerned primarily with ore deposits containing mercury, 4 with those containing copper, 3 with chromium or nickel, 2 each with tin, zinc, and tungsten, and 1 each with molybdenum, iron, and coal. The geographic distribution of these projects by regions is as follows: 5 in southeastern Alaska, 4 in the Prince William Sound-Copper River region, 4 in the Cook

Inlet-Alaska Railroad region, 5 in the Kuskokwim region and adjacent parts of southwestern Alaska, and 4 in the western Yukon-Seward Peninsula region. A technical and professional staff of approximately 40 geologists is employed for the field and office work involved in these different projects. During the field season more than a score of temporary helpers, such as cooks, packers, boatmen, or camp hands are hired to assist in the nontechnical but nevertheless essential phases of the work. To help in the office duties involved in maintaining the necessary records, typing reports, and handling correspondence, a staff of 7 clerks is employed.

During the fiscal year 1943, 6 reports with maps, 2 reports without maps, and 6 press releases have been published; 37 brief résumés on strategic and critical minerals investigations have been transmitted to war agencies; 7 reports containing maps and 1 map are in process of publication; 10 reports are in course of preparation; 7 résumés on strategic and critical minerals investigations are in course of preparation for submission to war agencies; and 4 reports prepared by the personnel of the Alaskan Branch were approved for outside publication.

TOPOGRAPHIC BRANCH

The headquarters offices of the Topographic Branch and its Atlantic Division are located in Washington, D. C.; the headquarters office of the Central Division is in Rolla, Mo.; and that of the Pacific Division is in Sacramento, Calif. Section offices are maintained in Chattanooga, Tenn., and Clarendon, Va.

GENERAL OFFICE WORK

The bulk of the work of the Topographic Branch consisted in carrying out a War Department program of mapping and producing maps of strategic areas. Necessary office work incidental to the field work was the computation and adjustment of the results of control surveys and the inking and editing of topographic maps prior to their submission for reproduction.

Section of Computing.—An unprecedented amount of transit traverse was done during the year in order to establish control for the many new strategic areas assigned by the War Department to the Geological Survey for topographic mapping. Of the total activity of the section the computing of the results of such surveys increased from the normal 12 percent to a little more than 50 percent.

Check computations for geographic positions were completed for 244 astronomic stations where prismatic astrolabe observations had been made by the Army Air Corps.

Bulletins 930-A, 930-B, and 930-C, which are three of the four parts of "Spirit leveling in Illinois," were published during the year. Manuscript for the fourth part, Bulletin 930-D, was prepared and transmitted for publication. Results of leveling, traverse, and triangulation for various quadrangle areas were issued in 176 lithographed lists.

Computation and adjustments for routine field projects were continued, and the usual volume of control data was assembled and transmitted to comply with requests from field engineers and correspondents.

Section of Photomapping.—Work in this section is performed in Washington and in field offices located in Clarendon, Va., and Chattanooga, Tenn. Photomapping is also carried on in Rolla, Mo., and in Sacramento, Calif., under the immediate direction of the division engineers in charge. The work consists of the production of topographic maps from aerial photographs by stereophotogrammetric methods; production of planimetric maps and planimetric bases for topographic field surveys by both stereophotogrammetric and graphic methods; preparation of designs, specifications, and contracts for photogrammetric equipment; preparation of requisitions and specifications for contracts for aerial photography; and purchase of photographs from other agencies.

By stereophotogrammetric and graphic methods topographic maps covering an area of approximately 5,750 square miles and planimetric maps and bases covering an area of approximately 14,250 square miles have been produced during the year. This does not include the work performed in the Chattanooga office, which is engaged on a cooperative project with the Tennessee Valley Authority and the United States Army. Twenty-four of the Geological Survey personnel are detailed to that office.

The Washington office maintains a general file of aerial photographs utilized in the work of the Geological Survey and of negatives of aerial photographs that have been purchased under contracts for photography negotiated by the Geological Survey since 1938. Through this office contacts have been maintained with other governmental agencies involved in aerial photographic work.

The principal office of the Section of Photomapping is in Clarendon, Va. In that office, in addition to the large production facilities which are being operated on a two-shift basis, there are also maintained a central laboratory for designing, testing, repairing, and adjusting all types of special optical and mechanical equipment utilized for stereophotogrammetric work, and a photographic laboratory spe-

cializing on research and precision photography required for all the field offices of the section.

Section of Cartography.—The Topographic Branch has cooperated with the Army Air Forces in preparing aeronautical charts, the work on which was executed in the Section of Cartography. Cooperation was also continued with the Public Roads Administration in preparing for publication and in proofreading 68 sheets of the Transportation Map of the United States, and 26 sheets are now in progress.

Work on the International Map of the World on the scale of 1:1,000,000 was continued. Sheet J-18, Chesapeake Bay, was published during the year, sheet K-16 is in course of publication, and sheets I-18, K-10, K-17, and L-10 are in progress.

Numerous miscellaneous jobs were done for other Government agencies.

Section of Inspection and Editing.—During the year 13 planimetric maps were prepared for photolithography; 240 new topographic maps were edited for publication, 160 of which were for multicolor photolithography and 80 for engraving; 573 quadrangle maps, 4 State maps, and 3 State index maps were prepared and edited for reprint editions; 29 maps were edited to furnish prints for reproduction by outside contractors; and editing was completed on 178 maps prepared as illustrations for reports. Four hundred and seventy-one proofs of all kinds were read. On June 30, maps in process of reproduction included 117 for engraving and 77 for multicolor photolithography; maps being edited or awaiting editing included 58 maps for engraving and 115 for multicolor photolithography. In Clarendon, Va., a drafting force was maintained for the drafting of maps for the Atlantic Division.

MAP INFORMATION OFFICE

The Map Information Office continued its work as clearing agency for data pertaining to maps and aerial photographs of both Federal and commercial agencies. This office maintains extensive card-index and map files and is equipped to furnish data to Federal and State institutions and to an interested public. The war activity has greatly increased the work of this office.

FIELD SURVEYS

Topographic mapping was carried on in 30 States, the District of Columbia, and Puerto Rico. Cooperative projects were conducted in 17 of these States, in Puerto Rico, and with the Tennessee Valley Authority.

The mapping of 79 15-minute quadrangles and 149 7½-minute quadrangles was completed; mapping was in progress on 56 15-minute quadrangles and 115 7½-minute quadrangles; and work on 285 quadrangles is progressing in some one of the steps prior to actual mapping. Of the 228 quadrangles mapped and the 456 which are in progress, 582 are within the strategic area designated by the War Department. Of the 241 maps published, 160 are within this area.

Surveys for four special areas for the geologic investigation of strategic and critical minerals were completed, and work was in progress on five similar areas. The survey of the Olympic National Park in the State of Washington was begun, and the resurvey of Washington, D. C., and vicinity was completed.

Of the total area of the United States, 47.1 percent has now been covered by adequate topographic maps produced by the Geological Survey. As the economic use of maps increased, a demand for more detailed maps arose, and, consequently, 196,832 square miles, or 6½ percent of the entire area of the country has been remapped.

Topographic mapping by the Geological Survey in the United States, Puerto Rico, and Hawaii, to June 30, 1943

State	Area mapped during fiscal year 1943 for publication on standard scales, contour intervals from 5 to 50 feet (square miles)				Total area mapped to June 30, 1943 (square miles)	Per-centage of total area of State mapped to June 30, 1943	Control, fiscal year 1943		
	Field scale		New survey	Resur-vey			Spirit levels (miles)	Trans-it trav-erse (miles)	Tri-angulation stations estab-lished
	1 to 24,000 or larger	1 to 48,000							
Alabama.....	50	882	633	291	25,842	50.1	103	83	-----
Arizona.....	-----	717	717	-----	33,195	29.1	179	-----	-----
Arkansas.....	392	242	242	392	24,609	46.3	86	27	3
California.....	324	1,594	1,730	188	132,176	83.3	34	-----	-----
Colorado.....	236	233	-----	469	58,166	55.8	-----	-----	-----
Connecticut.....	1,722	-----	-----	1,722	5,009	100.0	350	38	-----
Delaware.....	-----	-----	-----	-----	2,057	100.0	-----	-----	-----
District of Columbia.....	-----	-----	-----	-----	69	100.0	-----	-----	-----
Florida.....	657	-----	657	-----	9,114	15.6	457	116	-----
Georgia.....	271	(1)	-----	271	25,292	42.8	-----	-----	-----
Idaho.....	-----	-----	-----	-----	37,272	44.6	-----	-----	-----
Illinois.....	-----	743	737	6	44,313	78.6	-----	-----	-----
Indiana.....	480	-----	480	-----	7,496	20.7	284	290	-----
Iowa.....	-----	-----	-----	-----	14,233	25.3	-----	-----	-----
Kansas.....	-----	409	-----	409	65,852	80.0	323	-----	-----
Kentucky.....	-----	-----	-----	-----	27,559	68.2	-----	-----	-----
Louisiana.....	-----	1,828	1,828	-----	16,395	33.8	840	370	-----
Maine.....	-----	342	-----	342	25,764	77.6	249	911	-----
Maryland.....	-----	-----	-----	-----	10,577	100.0	-----	-----	-----
Massachusetts.....	1,324	-----	-----	1,324	8,257	100.0	186	454	-----
Michigan.....	609	-----	500	109	16,321	28.0	165	119	-----
Minnesota.....	-----	-----	-----	-----	9,542	11.4	-----	-----	-----
Mississippi.....	-----	-----	-----	-----	8,997	18.9	-----	-----	-----
Missouri.....	-----	1,725	1,020	705	59,935	86.0	931	119	-----
Montana.....	-----	76	76	-----	38,904	20.4	-----	-----	-----

Topographic mapping by the Geological Survey in the United States, Puerto Rico, and Hawaii, to June 30, 1943—Continued

State	Area mapped during fiscal year 1943 for publication on stand- ard scales, contour intervals from 5 to 50 feet (square miles)				Total area mapped to June 30, 1943 (square miles)	Per- cent- age of total area of State mapped to June 30, 1943	Control, fiscal year 1943		
	Field scale		New survey	Resur- vey			Spirit levels (miles)	Trans- it trav- erse (miles)	Tri- angu- lation sta- tions estab- lished
	1 to 24,000 or larger	1 to 48,000							
Nebraska.....					28, 225	36. 5			
Nevada.....					43, 543	39. 4			
New Hampshire.....	40	105		205	9, 304	100. 0			2
New Jersey.....					7, 836	100. 0			
New Mexico.....		504	504		36, 156	29. 7			
New York.....	188	74		262	49, 576	100. 0	3, 225	3, 123	
North Carolina.....					10, 574	37. 1			
North Dakota.....					16, 115	22. 8			
Ohio.....					41, 222	100. 0			
Oklahoma.....		244	244		41, 586	59. 5	148		
Oregon.....		1, 448	820	628	35, 421	36. 5	188		10
Pennsylvania.....	57	221	221	57	42, 302	93. 3	1, 719	818	
Rhode Island.....	516			516	1, 214	100. 0			
South Carolina.....					15, 772	50. 8			
South Dakota.....					20, 750	26. 9			
Tennessee.....					23, 998	56. 8			
Texas.....		464	464		92, 482	34. 6	97		
Utah.....					20, 119	23. 7			
Vermont.....	5	82	82	5	9, 258	96. 3	945	836	
Virginia.....		568		568	38, 007	93. 3	34	188	
Washington.....		1, 060	219	841	43, 726	64. 1	148		31
West Virginia.....					24, 181	100. 0	22	17	
Wisconsin.....		(1)			20, 273	34. 1		532	15
Wyoming.....	47		38	9	35, 360	36. 1	62		13
Total.....	6, 918	13, 621	11, 212	9, 327	1, 422, 936	47. 1	10, 765	8, 041	74
Hawaii.....					6, 435	100. 0			
Puerto Rico.....	2 056		956		1, 969	57. 3			10

¹ Planimetric maps, not included in total surveys, were compiled from aerial photographs with field examination—Georgia, 525; Kansas, 119; and Wisconsin, 974 square miles.

² Contour interval in meters.

WATER RESOURCES BRANCH

Water enters in countless ways into man's activities; in all it is important, in some it is controlling. In time of floods, however, it is a source of damage to property and danger to life. Reliable information on water is therefore necessary for the effective adaptation of man's activities to its availability.

The Geological Survey is the Federal agency authorized to collect and publish essential facts about the quantity, chemical quality, availability, and best methods of utilizing the water resources of the Nation. Its reports constitute a great reservoir of reliable information with respect to those resources. They are used by planners in organizing projects; by engineers in evaluating projects and in designing and

ling structures; by operators of water-supply, irrigation, power, other water-using systems; by bankers in financing developments in protecting the integrity of stocks and bonds and the security investments; by lawyers in litigating rights and damages; and by ts in arriving at equities. The information contained in the ey's water reports is, therefore, intimately related to the lives, ities, and security of the general public.

funds aggregating more than \$3,000,000 were available for water-urces investigations during the fiscal year 1943. Of that amount at 43 percent was appropriated by Congress, about 33 percent was istributed by States and municipalities, and about 24 percent was sferred or reimbursed by other Federal agencies.

COOPERATION WITH STATES AND MUNICIPALITIES

he appropriation by Congress for studies of water during the fiscal e 1943 was \$1,298,800. Of that appropriation \$975,000 was irected for use in cooperation with States and municipalities, but cooperating agencies contributed considerably more than that ount and sufficient additional Federal funds were supplied from unrestricted part of the appropriation to meet the excess offerings. e amounts contributed by States and municipalities are summar- l below:

<i>Contribution</i>	<i>State</i>	<i>Contribution</i>	<i>State</i>	<i>Contribution</i>
ama..... \$10, 625	Maryland.....	\$11, 725	Oregon.....	\$25, 725
na..... 21, 900	Massachusetts.....	14, 250	Pennsylvania.....	28, 975
nsas..... 10, 750	Michigan.....	18, 250	Rhode Island.....	1, 750
ornia..... 71, 920	Minnesota.....	12, 550	South Carolina.....	5, 450
rado..... 33, 300	Mississippi.....	15, 000	South Dakota.....	400
ecticut..... 9, 650	Missouri.....	12, 120	Tennessee.....	8, 600
ware..... 300	Montana.....	18, 960	Texas.....	74, 472
da..... 39, 225	Nebraska.....	25, 000	Utah.....	25, 950
gia..... 15, 000	Nevada.....	1, 500	Vermont.....	4, 760
o..... 25, 725	New Hampshire.....	10, 575	Virginia.....	28, 616
is..... 15, 150	New Jersey.....	21, 600	Washington.....	27, 203
ana..... 14, 379	New Mexico.....	38, 650	West Virginia.....	8, 560
t..... 21, 725	New York.....	68, 761	Wisconsin.....	8, 163
sas..... 34, 705	North Carolina.....	21, 060	Wyoming.....	17, 175
tucky..... 10, 050	North Dakota.....	5, 000	Hawaii.....	35, 602
isiana..... 18, 000	Ohio.....	18, 480		
ne..... 7, 500	Oklahoma.....	18, 030		

ACTIVITIES CARRIED ON FOR OTHER FEDERAL AGENCIES

Other Federal agencies provided nearly \$700,000 for water resources estigations that could not be financed by appropriated funds of e Geological Survey or included in cooperative programs. These encies are the Office of the Chief of Engineers, Mississippi River ommission, and Office of the Quartermaster General, War Depart-

ment; Bureau of Yards and Docks, Navy Department; Tennessee Valley Authority; Flood Control Coordinating Committee, Department of Agriculture; Weather Bureau, Department of Commerce; Bureau of Reclamation, Fish and Wildlife Service, National Park Service, Bureau of Mines, Office of Indian Affairs, Office of Land Utilization, and Bonneville Power Administration, Department of the Interior; Department of State; Federal Power Commission; and Federal Works Agency.

WAR SERVICE

Important as are the Survey activities with respect to water in peacetime, they are even more important in war. Authoritative information on the quantity and quality of available water has been sought during the initial period of planning and construction and is still being sought in connection with the selection of sites for military establishments, the erection of new industrial plants and enlargement of old plants engaged on war contracts, and the operation of all. In addition to the broad general use that has been made of the published reports, the Survey has made during the year more than 4,000 special war reports related to water, about 1,600 in the first 6 months and about 2,400 in the second 6 months. These reports were made to the War and Navy Departments, the War Production Board, industrialists and engineers employed on war contracts, and other miscellaneous Federal, State, municipal, and industrial agencies. They have related to water for cantonments, naval stations, military hospitals, training fields, air fields, munitions industries, manufacturing plants, hydraulic and steam power plants, emergency housing, increased municipal supplies, irrigation expansions for increasing the production of foods, inland-waterway navigation, flood protection, supplemental supplies during droughts, and emergency supplies provided to supplement regular supplies if those should be damaged by bombings. The reports have been concerned with the quantity, chemical quality, and availability of both surface water and ground water. They were based in part on information collected in previous years and in part on the results of special investigations made in regions where information was meager, or where possible deficiencies in quantity or doubtful quality of water appeared to be most threatening, where heavy pumping for war purposes had caused local depletions of ground water, or where there appeared to be danger of salt-water encroachment. They have been made in every State and in the Territories of Alaska and Hawaii, but have been of greatest intensity in the industrial regions of the East, South, and far West.

The speed and effectiveness of this special war service have been greatly promoted by the wide distribution over the country of the Survey's professional personnel, with headquarters in nearly 100 field offices. It has thus been possible in any region to make easily and quickly available the services of specialists on water who are well informed on local conditions and problems. The war services have been promoted also by the cooperation with States and municipalities, whose officials have made freely available the services of their personnel and the information contained in their files and in their published and unpublished records. This pooling of Federal and local resources and efforts has demonstrated to an extent not previously recognized the value of the programs of cooperation in time of National emergency.

CONTINUING ACTIVITIES RELATED TO BOTH WAR AND PEACE

The operations of the Geological Survey that are related to water are conducted by five administrative divisions—surface water, ground water, quality of water, utilization of water, and power resources. Because of the wide variations in quantity and quality of water, continuity of records is essential both for the emergency problems of war and for the recurring problems of peace; it is necessary, therefore, that at least as much of the ordinary activities of the Survey as will suffice to maintain continuity of records shall be carried on, even when the major efforts relate to war problems.

Records of the stage, quantity, or availability of surface waters are collected at about 5,000 gaging stations distributed through every State and the Territory of Hawaii, the number of stations depending upon the funds made available by cooperation with States and municipalities and by transfers from other Federal agencies. The field records are analyzed and released to the public and to the cooperating agencies as promptly as practicable. They are the basis for constructing, operating, and administering municipal and industrial water supplies, irrigation systems, power plants, flood-control works, inland waterways, and similar activities. Cooperation in surface-water studies is effective with about 150 State and municipal agencies, the personnel operating from 45 field offices.

The studies of ground water relate to the waters that lie in the zone of saturation, from which wells and springs are supplied. They cover the source, occurrence, quantity, and head of these waters; their conservation and artificial replenishment; their availability and adequacy for domestic, industrial, irrigation, and public supplies, and as watering places for livestock and desert travelers; and the methods of

ment; Bureau of Yards and Docks, Navy Department; Tennessee Valley Authority; Flood Control Coordinating Committee, Department of Agriculture; Weather Bureau, Department of Commerce; Bureau of Reclamation, Fish and Wildlife Service, National Park Service, Bureau of Mines, Office of Indian Affairs, Office of Land Utilization, and Bonneville Power Administration, Department of the Interior; Department of State; Federal Power Commission; and Federal Works Agency.

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constructing and utilizing wells and of improving springs. The increasing use of water from wells is causing a great demand for intensive studies of the quantities of ground water that are perennially available. Investigations conducted from 27 field offices were in progress during the year in nearly every State. In 34 States and in Hawaii the work was done in cooperation with 56 State and municipal agencies. Periodic measurements of water levels or artesian pressure were made in about 7,000 observation wells. Investigations were made or are in progress in most of the critical areas of heavy pumping to determine whether shortages in ground-water supplies are being caused by war demands.

Chemical analyses of 2,830 samples of water were made in the water-resources laboratory in Washington and of 5,263 samples in the division laboratories in Miami, Fla., Albuquerque, and Roswell, N. Mex., and Austin, Tex. Many of the samples were collected in connection with studies of water supplies for Army and Navy establishments and for munition plants and housing developments. Cooperative studies were continued on the chemical character of surface waters in Florida, Georgia, New Mexico, and Texas. Samples of water were analyzed for cooperative studies of ground-water conditions in other States. Interpretations of analyses or advice about water problems were furnished to 17 bureaus in 6 Federal Departments and to 10 independent agencies.

A variety of hydrologic and hydraulic studies and compilations are made on the utilization and control of streams, and a monthly summary, the Water Resources Review, is issued giving stream-flow and ground-water conditions throughout this country and Canada. These summaries are used extensively by many agencies, including major war agencies, engaged in production where floods or droughts are vital. The administration of certain responsibilities relating to permits and licenses of the Federal Power Commission has been continued. Because of the importance of power in the war program this function is increasingly essential. Investigations of water problems along the international boundary between the United States and Canada have been continued for the State Department and the International Joint Commission. Among the important problems studied have been the international aspects of storage above the Grand Coulee Dam and in Kootenai Lake, both related directly to the production of power for war.

CONSERVATION BRANCH

The principal functions of the Conservation Branch are (1) making surveys and investigations of the water and mineral resources of the

the domain and applying the results of such investigations to the needs of public-land administration and (2) supervising operations incident to the development of power and to the production of minerals, including oil, gas, coal, potash, sodium, lead, and zinc, from the lands, Indian lands, and naval petroleum reserves. During the present emergency these functions have been enhanced and extended and the proportions attained in times of peace. Exploitation and conservation of the natural resources of the United States have been and continue to be accelerated for the duration of the emergency in order to meet the war needs for critical minerals, chemicals, fuels, minerals, and water power, with a minimum dependence upon imports. The Conservation Branch, therefore, has given particular attention during 1943 to the location, availability, and extent of such resources under Federal control and has directed its energies, subsequent to December 7, 1941, toward increasing the contribution of public-land resources to the war program.

CLASSIFICATION OF LANDS

Mineral classification.—As consultant and adviser in geology to various Federal agencies, primarily those bureaus and offices in the Interior Department concerned with the administration of Federal, public, and Indian lands, the Mineral Classification Division conducted during the fiscal year its vital function of supplying geologic findings and decisions that are prerequisite to the issuance or transfer of prospecting, development, and production rights pertaining to such lands under the mineral-leasing laws; to the determination of areas for unitization agreements for oil and gas holdings and pertinent participating areas; to the utilization of Federal lands for right-of-way purposes; and to the issuance of patents to States and individuals in the final disposal of such lands under the nonmineral-land laws.

In all, 7,900 cases, each involving from one to many geologic determinations, were acted on. Additional office activity included the preparation, revision, or cancelation of definitions of the known geologic structure of four producing oil and gas fields, the total net area so defined in nine public-land States being 1,691,617 acres at the end of the fiscal year.

In aid of mineral classification, investigations were made of geologic conditions relating to coal, oil, and gas in Colorado, Montana, New Mexico, Oklahoma, South Dakota, Utah, and Wyoming and of geologic conditions at one dam site in Washington.

Water and power classification.—The work of obtaining basic information concerning the water-power resources and storage possibilities of Federal lands and of making such information available for use in the administration of the public-land laws was continued throughout the fiscal year. Office activity resulted in the addition of 21,288 acres to power-site reserves and the elimination of 1,602 acres therefrom, with net increase of the outstanding reserves in 22 States and Alaska to 6,635,432 acres; in final action involving hydraulic determinations on 170 cases received for report from departmental sources and the Federal Power Commission; and in water-power classification on 2,522 cases, which also involved mineral classification. Reservoir site reserves in 9 States remained unchanged at 137,172 acres. One final and two preliminary mimeographed reports and one manuscript report were prepared on stream utilization.

In the field, operations were on a reduced scale because of war conditions. Topographic surveys were made of 20 linear miles of stream valley and of 1 mineral leasehold, and, in cooperation with the Water Resources Branch, supervision of construction and operation was given to 163 power projects under license from the Federal Power Commission, to 179 such projects under permit and grant from the Department of the Interior, and to 151 in cooperation with the Office of Indian Affairs.

MINERAL LEASE SUPERVISION

Mine supervision.—The Mining Division is charged with the supervision of mining operations for the discovery and production of coal, potassium, sodium, phosphate, and oil shale in public lands; of sulfur in public lands in New Mexico and Louisiana; of gold, silver, and mercury in certain land grants; of all minerals except oil and gas in tribal and restricted-allotted Indian lands; and with the supervision of production on public lands by the Metals Reserve Co. under authorization of the Secretary of the Interior. It also serves as consultant to the Department of Agriculture on mining leases under the jurisdiction of that Department. The supervisory work was directed from 7 field offices in the western United States and Alaska and on June 30, 1943, covered 700 public-land properties under lease, prospecting permit, or license in 15 States and Alaska, 268 Indian properties under lease and permit in 14 States, and 3 Secretarial authorizations in 3 States, with an estimated value of production of approximately \$45,000,000.

In response to war demands for fuel, fertilizers, and strategic minerals, there has been a substantial increase in the production of coal, sodium, potassium salts, and phosphate rock from public-land proper-

work of and under supervision of the Mining Division, and accrued revenues correspondingly higher. The search for potash and associated such as cesium and aluminum was intensified. The issuance of Order 829 by the Secretary of the Interior on June 9 removed an 8-year restrictive order on the granting of potash prospecting permits and the laws, and a further increase in prospecting is anticipated during

Indian land mining activity was responsive to the same economic conditions and resulted during the year in the working of substantially higher-grade lead and zinc ores, a considerable increase in the production of coal and vanadium, and in prospecting with a view to further development of known deposits of vanadium, uranium, tungsten, and other.

Information and assistance on war-engendered problems relating to uses of coal for fuel, coke, resins, and as a supplemental source of other fuels, and of numerous metalliferous and industrial minerals in various parts of the country were provided by engineers of the division to numerous individuals contemplating development and to representatives of various State and Federal agencies.

Oil and gas supervision.—The Oil- and Gas-Leasing Division is charged with supervisory duties analogous to those of the Mining Division. They include operations for the discovery and production of petroleum, natural gas, natural gasoline, and butane occurring in public lands of the United States, in naval petroleum reserves, and in Indian lands subject to departmental jurisdiction, both tribal and non-tribal, except those of the Osage Nation in Oklahoma. During the calendar year 1943 the inspectional, regulatory, and accountancy duties of supervision were discharged through 19 field offices and suboffices in California, Colorado, Montana, New Mexico, Oklahoma, Utah, and Wyoming.

Petroleum and its derivatives are of vital importance to the successful prosecution of the war. By reason of heavy war-induced demands upon the productive capacity of known petroleum reserves in this country and an alarming reduction in the number of discoveries of new reserves, the military and certain Federal establishments have initiated prompt remedial efforts. The petroleum industry has made a timely response and has instituted a widespread prospecting and development program designed to relieve the critical situation in the shortest possible time, with due regard for the use of equally vital materials. This accelerated program has been reflected in increased activities on federally supervised oil and gas properties which currently contain about 7 percent of the known petroleum reserves in the United States and from which are extracted annually about 5 percent

of the crude oil produced in the United States. Enhanced activity and accelerated individual field studies and investigations, particularly those dealing with secondary recovery methods designed to augment the contribution of federally supervised oil resources to the war program, may reasonably be expected to produce those percentages during the ensuing few years.

On public lands the number of properties under supervision at the end of the fiscal year aggregated 4,472 and involved 2,819,211 acres in 19 States and Alaska.

Drilling on public lands during the year included the completion of 387 wells and the completion of 413 wells, of which 315 were productive of oil or gas and 98 were barren. In all, 10,532 productive wells, including 5,601 capable of oil and gas production, were under supervision on June 30, 1943. The production of natural gas and gasoline from public lands during 1943 was somewhat less than the production of crude oil was somewhat greater than during 1942.

During the year 10 new plans of unit operation involving public lands were approved and 4 were terminated, leaving 123 plans, containing 1,862,337 acres, outstanding on June 30, 1943. Production under approved unit agreements constituted about 40 percent of the petroleum, 61 percent of the natural gas, and 76 percent of the gasoline and butane obtained from public lands during the year.

On Indian lands the Oil- and Gas-Leasing Division supervised 4,221 leaseholds in 8 States, containing at the end of the year of 7,522 wells, 4,036 of which were productive of oil or gas and 3,486 of which had been completed during the year. Production from such leaseholds was somewhat greater than in the preceding year, owing principally to a substantial increase from Ootie Indian lands in Oklahoma. The discovery and development of valuable natural gas bearing natural gas on Navajo lands in New Mexico provided an outstanding contribution to the war program. Rentals, royalties, and bonuses accrued from operations on Indian land during the year are estimated to aggregate \$2,607,000.

On behalf of the Navy Department supervision was continued during 1943 over operations for the production of oil, gas, gasoline, and butane from 18 properties under lease in Naval Petroleum Reserves Nos. 1 and 2 in California and for the conservation of shut-in production in Reserve No. 3 in Wyoming. Production from 300 wells on Reserves Nos. 1 and 2 aggregated 2,269,735 barrels of oil, 1,619,390,000 cubic feet of natural gas, and 7,964,900 gallons of natural gasoline and butane, the aggregate royalty value being \$492,748.

WORK ON PUBLICATIONS

Texts.—The publications issued during the year numbered 94, including 76 reports in the regular series and 18 miscellaneous pamphlets, a total of 14,299 pages; 68 new manuscripts were received, and 65 were sent to the printer. Work on publications included the following: 12,563 pages of manuscript edited and prepared for printing; 939 galley proofs and 4,983 page proofs revised and returned; indexes prepared for 27 publications, covering 2,013 pages and consisting of 6,218 index entries. Copy prepared for mimeographing included 78 press releases, comprising 139 pages, and 165 pages of miscellaneous material.

Illustrations.—Twenty-four reports containing 320 illustrations were transmitted to the printer; of these, 9 reports with 38 maps and 8 sections were directly related to the war effort. In addition, 119 maps and 34 sections illustrating deposits of essential strategic minerals were prepared, and 263 proofs and 97 edition prints were examined.

Geologic map editing and drafting.—In order to make the results of its studies quickly available to public, the Geological Survey has from time to time prepared photostat copies of the geologic maps of areas containing minerals of war interest. These maps have been announced through press releases. Copy was edited for 23 maps to be photostated and for maps to be used in 26 printed reports of the regular series of publications.

Distribution.—The Division of Distribution received during the year a total of 858 publications, comprising 81 new books and pamphlets, 253 new or revised topographic and other maps, of which 12 maps were first published as preliminary editions, 44 Tennessee Valley Authority maps with contours, 409 reprinted topographic and other maps, 37 new advance sheets, and 34 reprinted advance sheets. The total units of all publications received numbered 149,289 books and pamphlets and 1,911,495 topographic and other maps, a grand total of 2,060,784. The division distributed 99,798 books and pamphlets, 883 geologic folios, and 910,021 maps, a grand total of 1,010,702, of which 800 folios and 805,502 maps were sold. The net proceeds (gross collections less copying fees and amounts refunded) from the sales of publications were \$16,056.72, including \$15,824.87 for topographic and geologic maps, and \$231.85 for geologic folios. In addition to this, \$38,525.91 was repaid by other establishments of the Federal Government at whose request maps or folios were furnished. The total net receipts, therefore, were \$54,582.63. The foregoing figures are exclusive of 486,965 Geological Survey maps delivered from the Division

of Engraving and Printing direct to the War Department on a repay basis.

Engraving and Printing.—During the year 253 new maps were printed and delivered. These consisted of 83 newly engraved topographic maps (including 3 revised maps), 160 multicolor topographic maps (12 of which were originally printed as preliminary editions), and 10 special maps. Reprint editions of 396 engraved topographic maps of 13 photolithographed State and other maps were printed and delivered. Of new and reprinted maps, 662 different editions, amounting to 1,835,165 copies, were delivered. A large amount of work was done for 85 other units of the Government, including branches of the Geological Survey, and the charges for it amounted to about \$190,000, for which the appropriation for engraving and printing geologic and topographic maps was reimbursed. Transfer impressions and velox prints, numbering 523, were made during the year, and the amount turned over to miscellaneous receipts was \$216.73. Topographic maps and contract and miscellaneous work of all kinds, totaling 3,156,063 copies, were printed and delivered. The photographic laboratory made 12,923 negatives, 27,912 prints, 2,810 photolith press plates, 260 intaglio etchings, and 6 celluloid transfers, and mounted 1,741 prints.

LIBRARY

The first full year of participation in the war was strongly reflected in the work of the Library. In addition to assisting the Survey, especially in its work on military geology, the Library has been serving directly the War and Navy Departments, the War Production Board, the Board of Economic Warfare, and all the agencies whose work requires source material in natural resources, geology, or engineering. A total of 13,526 readers used the Library during the fiscal year, double the number normally served. More than 75,000 pieces of material were circulated, almost double that of a normal year and 20,000 more than last year's total of nearly 56,000, itself a record. Acquisitions again were below normal. Not only have most of the foreign publications been cut off, but some American publications have been suspended or curtailed. The bibliography and index of North American geology, 1940-41, was received from the printer in April. The cumulative index, 1929-39, has been sent to the printer.

FIELD EQUIPMENT

A large number of the instruments used for war activities by the several branches of the Geological Survey are designed, constructed,

and repaired by the Division of Field Equipment. Many improvements have been made, especially in the mechanical devices used to produce trimetrogon maps from aerial photographs for the Air Corps. A new device, called an angulator, has been designed and constructed to further facilitate such work. The angulator performs functions similar to those of the rectoblique plotter but has fewer limitations in that it permits the use of photographs taken at practically any angle with the horizon by cameras having various focal lengths. The problems of administration, relief work, reconstruction, and pioneering that follow every war invariably carry with them an immediate need for dependable maps of the areas involved. Areas in interior Alaska, Canada, Russia, China, and Africa are particularly deficient in adequate maps. The mechanical devices constructed by this division for use in connection with the trimetrogon mapping method offer a rapid practicable means for reconnaissance mapping of combat and strategic areas and for making the reconnaissance maps that will be urgently needed in the early post-war period. Improvements have also been made in the design and construction of isometrographs, which are used by geologists for the semimechanical conversion of topographic maps into relief diagrams that provide pictorial representations of land surfaces. This equipment may also serve valuable purposes during the post-war period, as its use speeds the work of searching for new sources of metals, minerals, and other valuable natural resources, the present supplies of which are now being rapidly depleted.

FUNDS

During the fiscal year 1943 there was available for expenditure under the direction of the Geological Survey a total of \$11,129,028. Of this amount \$4,699,390 was appropriated directly to the Geological Survey, and \$6,429,638 was made available by other Federal agencies, and by States and their political subdivisions. In addition, \$9,104 was allotted from the appropriation for contingent expenses of the Department of the Interior for miscellaneous supplies.

Funds available to the Geological Survey in 1943 from all sources

General administrative salaries:

Interior Department Appropriation Act.....	\$181, 625
Urgency Deficiency Appropriation Act.....	8, 300
	<hr/> \$189, 925

Topographic surveys:

Interior Department Appropriation Act.....	\$689, 030	
States, counties, and municipalities.....	337, 270	
War Department.....	2, 199, 124	
Tennessee Valley Authority.....	76, 900	
Public Roads Administration.....	56, 493	
Miscellaneous repay.....	50, 787	
		\$3, 418, 613

Geologic surveys:

Interior Department Appropriation Act.....	961, 485	
States, counties, and municipalities.....	40, 090	
Bureau of Mines.....	115, 000	
Board of Economic Warfare.....	20, 000	
War Department.....	30, 000	
Miscellaneous repay.....	8, 151	
		1, 174, 726

Strategic and critical minerals:

Interior Department Appropriation Act.....	644, 580	
State Department (for work in other American Republics).....	96, 500	
		741, 080

Mineral Resources of Alaska:

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Bureau of Reclamation

HARRY W. BASHORE, Acting Commissioner¹

THE spotlight of war retained a sharp focus during the fiscal year 1943 on two major fields of production—food and power. In both, the activities of the Bureau of Reclamation in the western third of the Nation played a major role.

The productive farms served by its irrigation facilities provided bountiful food crops to a hard-driving, fighting Nation. At the same time the Bureau's mighty hydroelectric generators sent an ever-growing stream of kilowatts into war production plants and projects.

In the early days of the war one of the greatest single tasks confronting the United States was to overcome Axis superiority in the production of planes, tanks, ships, and guns. Toward this objective the Bureau offered great blocks of power. The far-sighted policy which was exemplified in the construction of Boulder, Grand Coulee, and Parker Dams in time of peace to keep ahead of the inevitable growth of the West, paid immediate dividends as the Nation prepared for war. Reclamation's pre-Pearl Harbor installations were doubled by June 30, 1943. Generators rated at 900,000 kilowatts were added, most of them 2 to 10 years ahead of schedule. The potential output from the new capacity is sufficient to manufacture the aluminum to build more than 30,000 giant four-motored bombers annually.

Major attention also was directed toward measures to augment food stocks which were required to meet the increased demands of the armed forces, lend-lease countries, liberated peoples across the seas, and civilians at home.

The Bureau of Reclamation anticipated the wartime need for more food and was prepared to bring about increased food production to

¹Mr. Bashore, Assistant Commissioner of Reclamation since May 27, 1939, was appointed Commissioner by President Roosevelt and took office on August 3, 1943. William E. Warne, former Chief of Information of the Bureau, was appointed Assistant Commissioner by the Secretary of the Interior at the same time and entered on his duties on August 9. Due to ill health, John Chatfield Page, Commissioner of Reclamation since January 25, 1937, resigned his position in June.

meet an emergency as critical as the earlier need for increased hydroelectric power. From the nearly 4,000,000 acres of irrigated land served by Reclamation systems in 15 western states came large supplies of vital foods—beans, potatoes, sugar, fruits, and other commodities equally important. The output for the calendar year 1942 was valued at more than a quarter of a billion dollars, 45 percent greater than the record crop return for 1941.

For the 1943 season Reclamation farmers diverted their efforts from the less essential to the more important war crops. This "win the war" spirit resulted in record spring plantings of potatoes, beans, and alfalfa (for beef and dairy herds), the harvest of which is expected to exceed the high 1942 production total.

The Bureau's war food construction program to extend its irrigation service to nearly 2,000,000 additional acres by 1945 was given impetus toward the close of the year by congressional recommendations. The Senate and House Appropriations Committees urged the War Production Board, which controls construction, to reexamine stop-orders which that agency had issued against irrigation construction late in 1942 in order to divert critical materials to other war purposes. The objective was to obtain authorization to resume work on 19 projects and to initiate construction on others. Appropriations were made to advance the program.

The War Food Administration, which has the responsibility for food production, specifically recommended to the War Production Board that irrigation construction on eight Bureau projects, affecting about 900,000 acres, be permitted. Up to June 30 clearances had been given by the Board on projects serving 278,000 acres.

The power made available in the fiscal year from two new plants brought into operation and from additional generators at other major projects was responsible for much of the West's continued expansion in war production. With a 35 percent increase in capacity and a 100 percent gain in output, Reclamation plants supplied power to industries which produce aluminum and magnesium, airplanes, ships, ferro-alloys for tanks, explosives and manganese, and which process foods, and provide other materials vital to the prosecution of the war.

The output of Bureau power plants this fiscal year was 9½ billion kilowatt-hours. Additional installations in progress on June 30 indicate a production in the next fiscal year of 15 to 16 billion kilowatt-hours—a volume greater than was produced by all power plants in the United States in 1914.

Bureau facilities provided industrial water for war industries and municipal water for the civilian and military population of the Los

Angeles area and other western centers. This service also was an effective aid toward greater war output.

Through irrigation, power, or municipal water service, nearly all of the 52 Reclamation projects in operation facilitated war activities at such important points as Army and Navy military posts, air bases and training centers, and war production plants. Nearly 5,000,000 persons, a third of the population of the West, live in the areas which are served by the Bureau's systems.

While concentrating on war activities, the Bureau continued its investigation of the feasibility of irrigation and multiple-purpose projects which will be added to a shelf of post-war public works. The construction of these projects will provide local and regional employment and contribute to national post-war industrial activity. When completed, these projects will provide permanent settlement opportunities on irrigated land for demobilized service men and industrial workers.

The Bureau of Reclamation has as its objective the conservation of the limited water resources of the West for irrigation, power development, domestic and industrial water supply, and for other beneficial uses. Under the Reclamation Act of 1902, the Bureau's activities are confined to the 17 states west of, or bisected by, the 100th meridian. Except for a narrow strip on the Pacific coast, north of San Francisco, and in the high mountains, the rainfall in this region is inadequate, and irrigation is necessary to sustain agriculture. While coal, oil, and gas as fuel for power plants are available in some areas, the principal reliance is on hydroelectric developments for war and peacetime industries, and for military, commercial, domestic, and rural needs.

FIVE MILLION PERSONS IN AREA SERVED

Of the nearly 5 million persons who live in the areas which are served by the facilities provided by the Bureau of Reclamation in 15 western states, more than 3½ million were supplied power and domestic water, and 1,197,880 lived on the 88,050 farms which are served by the irrigation projects or in the 316 towns on or near these developments. In the irrigation areas served were 1,187 schools, 1,484 churches, and 137 banks with deposits totaling \$520,357,000 (see table 3).

At the end of the fiscal year 71 projects were in operation, under construction, or authorized. Fifty-two of this number were generating power or supplying water for irrigation or for domestic, military, or industrial use. Important features remain to be constructed on many of the projects that are in operation. Nine others are in vary-

ing stages of construction. Also authorized are nine projects on which the initiation of work was deferred at the beginning of the war. One project, authorized at the close of the fiscal year, is scheduled for early construction.

The storage capacity of 81 reservoirs in operation reached a new high of more than 64 million acre-feet, about 20,000 billion gallons. The 151-mile long lake behind Grand Coulee Dam (Columbia Basin project, Washington) reached capacity for the first time on July 12, 1942.

Cumulative crop values for the 41 years of operation have passed the 3 billion dollar mark (see table 2). The amount is more than four times the construction costs through June 30 (see table 5).

Under the Reclamation Act and amendments, and other legislation, more than 95 percent of the construction costs of projects is reimbursable. The remainder is allocated to flood control, aid to navigation, contributed labor, or will be repayable by municipalities for supplemental water supplies.

FOOD ASSUMES INCREASED SIGNIFICANCE

Long before the necessity for expanding the Nation's agricultural plant for war purposes was given the proper emphasis, the Bureau was reappraising its facilities and construction program to determine what contributions it could make toward increasing food production. The Bureau recognized that through construction of additional irrigation systems new lands could be brought into cultivation promptly and supplemental water could be provided for irrigated areas where water shortages were curtailing crop production.

The Bureau was also fully aware that because of the increased demand for food in the Far West due to war conditions it was doubly essential to expand irrigated agriculture in the arid and semiarid regions. This demand resulted from military concentrations, the growing civilian population, lend-lease requirements, and overseas shipments to the armed forces in the Western Pacific. Dependent on irrigation for 75 percent of its food and never self-sufficient in dairy products and meat, the West faced a critical situation. Added imports from the Middle West and East further taxed transportation facilities already overburdened with movements of troops and materials.

In March 1942, the Bureau proposed an accelerated program for expanding existing and developing new water supplies which called for a speed-up of work on projects under construction. It also included the initiation of new undertakings. The program would have made more water available for food production in 1943, 1944, and 1945.

Through the summer of 1942, the Bureau continued construction on 25 projects insofar as critical materials were available. The restricted construction came to a virtual standstill, except for power installations on five projects, following a sweeping stop-construction order which was issued by the War Production Board late in 1942. Subsequently limited construction of certain facilities was permitted on 12 irrigation and municipal water projects.

Alive to the increasing food requirements in the winter of 1942-43, the Bureau presented a second accelerated program under which, by 1945, the irrigated acreage it serves could be increased by 75 percent. The lands benefited were to be devoted primarily to the production of beans, potatoes, and alfalfa for livestock feed—critical war foods.

In March, the Secretary of the Interior announced a departmental food program under which the Bureau could extend irrigation service to a total of 9,000,000 acres in 5 years. Under this program, the output from irrigated land of some of the more important war crops could be doubled by 1947. The achievement of the results under these programs depended on immediate clearance for critical materials, adequate funds, and manpower. As a result of delays in obtaining these prerequisites, a revised program was outlined in June 1943 under which irrigation service could be extended to 2,000,000 additional acres by 1945. This program included resumption of construction on 19 projects on which work had been halted by stop-construction orders and initiating construction on a large number of new projects. Emphasis, as in the previous programs, was placed on those which could be begun quickly and which would require a minimum of critical materials.

Acting to get the projects approved and construction started, the Bureau presented detailed information on each to the War Food Administration which had the authority to recommend irrigation construction to the War Production Board.

At the close of the year, the War Food Administration had recommended for wartime construction eight projects proposed by the Bureau of Reclamation, as follows:

Colorado.....	Colorado-Big Thompson and Mancos. ¹
Idaho.....	Anderson Ranch Dam (Boise).
California.....	Central Valley (Friant Dam, Madera and Friant-Kern Canals).
Oregon-Calif.....	Klamath-Modoc. ¹
South Dakota.....	Rapid Valley. ¹
Utah.....	Newton. ¹
Washington.....	Yakima-Roza. ¹

¹ War Production Board approved resumption of construction on July 27, 1943.

Of these, Friant Dam and the Madera Canal of the Central Valley project had been given clearance by the War Production Board on June 30 and the remainder were under consideration. Construction to protect the Yuma (Arizona) air base from dust storms had previously been authorized on the Gila project. Clearance had also been given on Scofield Dam in Utah primarily as a flood control measure. Both projects will aid in food production.

The Bureau personnel encouraged a shift from less essential to the more important war crops. As of June 30, 1943, reports of actual and estimated plantings received from 26 projects, comprising 82 percent of the total acreage of all projects, showed a 44.5 percent increase in potato acreage, a 36.2 percent increase in bean acreage, and a 1.8 percent increase in alfalfa acreage. The production of alfalfa, fed to beef and dairy stock, means increased quantities of meat and dairy products. The 1943 cultivated acreage will be the largest ever reported for Federal Reclamation projects.

POWER FOR WAR

Keeping ahead of the unprecedented industrial expansion in the West, Reclamation power production rose from about 4¾ billion kilowatt-hours in the fiscal year 1942 to about 9½ billion in 1943, an increase of 100 percent.

The installed capacity of 30 power plants on 19 projects in 11 states is practically double the June 30, 1941 installation. The new 900,000 kilowatts made available in the 2-year period—potentially more than 7 billion kilowatt-hours—was transmitted almost entirely to busy war production centers. Translated into terms of war equipment, the added power is highly significant. It is sufficient to produce annually more than 30 huge battleships or more than 11,000 four-motored bombers.

Most of the new generators were installed far ahead of schedule. At Grand Coulee about half a million kilowatts were installed 2 to 5 years ahead of original plans. Initial schedules called for the first generator to be in service at Grand Coulee in 1943 or 1944. Instead, five giant machines are now turning. Parker Dam power plant, situated on the Colorado River below Boulder Dam and rated at more than 115,000 kilowatts, was put into operation 8 years ahead of schedule.

The gain in Reclamation power capacity during the fiscal year totaled about 480,000 kilowatts. In addition the Bureau began transmitting power from the Fort Peck (Montana) plant, built by the Corps of Engineers, War Department.

The gross revenue from power plants operated by the Bureau rose to a new high of \$14,335,613.01 as compared with \$8,233,477 in the fiscal year 1942.

Power produced at Grand Coulee Dam was consumed chiefly by aluminum reduction industries. From this area came 30 percent of the national output of this important light metal. Also served in this region are many shipyards and other war plants. The Pacific Southwest is to a large extent dependent on power generated at Boulder and Parker Dams on the Colorado River. Here are situated the largest magnesium plant in the world, major airplane factories, and industries producing steel, aluminum, ammunition, ships, and synthetic rubber. This power is also used in mining operations. In the intermountain states, war industries, food processing plants, and military establishments are served.

Boulder Dam power plant moved still further out in front as the largest in the world, its capacity being increased to nearly a million kilowatts by the addition of two more generators.

Grand Coulee took its place as the world's third largest hydroelectric development with an installation at the end of the year of nearly a half million kilowatts. Two units of more than 70,000 kilowatts each were transferred to this power plant from Shasta Dam (Central Valley project, California) to make their output available a year ahead of schedule. The Shasta powerplant was not ready to receive the machines and others would be available when the plant was completed.

Two units of more than 10,000 kilowatts each were installed in the Green Mountain Dam power plant, the first feature of the Colorado-Big Thompson project (Colorado) to begin operation.

The War Production Board late in 1942 permitted installations rated at 776,000 kilowatts to proceed at five projects, while halting installation of 865,000 kilowatts. In addition to the new generators at Boulder, Parker, Grand Coulee, and Green Mountain Dams, which have gone into operation, other installations were excepted from a general stop-construction order. These included an additional generator at Boulder Dam, to be in service in October 1944; three generators at Grand Coulee, scheduled to be in operation by February 1944; two generators of more than 70,000 kilowatts at Shasta Dam, to begin operating by March 1944; and a 97-mile transmission line from Shasta Dam to Oroville, Calif., over which Shasta power will be delivered for distribution to war industries in northern California.

Power installations scheduled for service before 1945-46, which were halted, totaled 865,600 kilowatts. These included generators at Keswick Dam of the Central Valley project, and Anderson Ranch

Dam of the Boise project (Idaho), where all construction work was limited. Work was barred on Davis Dam and power plant on the Colorado River in the Pacific Southwest and on facilities which would have made possible installations at six power plants (other than Green Mountain Dam) on the Colorado-Big Thompson project. Three big generators for the right powerhouse at Grand Coulee Dam and an additional machine for Shasta Dam were also barred.

WATER SERVES WAR INDUSTRIES

In addition to providing power for war industries and irrigation water for increased food production, Reclamation projects made available, as a third major war contribution, a reliable supply of water for war factories and military centers. Five operating projects provided water and, in addition, a municipal supply for civilian use. Additional construction on one of these projects and on three others which are under construction will extend this service in the future.

Los Angeles and 12 other cities of the southern California metropolitan area, and the world's largest magnesium plant near Las Vegas, Nev., receive fresh water from the Colorado River through the Boulder and Parker Dam system.

The Contra Costa Canal of the Central Valley project (California) is the source of a supplemental supply for the cities of the upper San Francisco Bay region and for industries in the Pittsburg, Calif., area. Military encampments near El Paso, Tex., are dependent on the irrigation reservoirs of the Rio Grande project (Texas-New Mexico); and the cities of Salt Lake, Provo, and Ogden on projects in Utah.

To provide added industrial and domestic water for the increased population of the Salt Lake and Provo areas, resulting from the establishment of large military centers and from the expansion of industry, the Bureau, under limited War Production Board clearance, is continuing enlargement of the Weber-Provo Canal part of the Provo River project. This construction also will provide a supplemental supply of irrigation water for a large area of land.

The other three projects under construction are the Altus project (Oklahoma), the Rapid Valley project (South Dakota), and the Tucumcari project (New Mexico) which will supplement existing municipal storage for the cities of Altus, Rapid City, and Tucumcari, respectively, as well as irrigate land in the vicinity of each.

TABLE 1.—*Reclamation areas and crop returns, calendar year 1942¹*

	Irrigable area ²	Irrigated area	Area in cultivation (paying area)	Crop values	
				Total	Per acre
Regular projects	<i>Acres</i> 2,377,483	<i>Acres</i> 1,897,828	<i>Acres</i> 1,873,979	\$138,181,276	\$73.74
Storage projects ³	1,014,223	790,895	796,442	55,602,431	69.81
Storage projects (no crop returns)	69,376				
Special and Warren Act lands	1,360,757	1,247,512	1,206,651	78,264,809	64.86
Grand total, 1942	4,821,839	3,936,235	3,877,072	272,048,516	70.17
Grand total, 1941	4,915,716	3,448,383	3,380,460	159,885,997	47.30
Increase or decrease, 1941-42	-93,877	+487,852	+496,612	+112,162,519	+22.87

¹ A detailed table of area and returns by individual projects is available on request from the Bureau of Reclamation, Washington, D. C.

² Area for which the Bureau is prepared to supply water.

³ Includes Imperial Valley (California) served by the All-American Canal (not previously reported).

⁴ Decrease from 1941 to 1942 explained by readjustments of estimated acreage.

CROP VALUES SOAR TO NEW HIGH

The gross value of crops produced on land which is served by Reclamation facilities rose to a record high of \$272,048,516 during the calendar year 1942. The figure for the first time included returns, amounting to \$38,163,991, from the Imperial Valley of California, wholly served for the first year by the All-American Canal of the Boulder Dam system. Exclusive of the Imperial Valley, the gross returns from Reclamation projects in 1942 was 45½ percent greater than in 1941, when the grand total was \$159,885,997, and 100 percent greater than the next previous high, \$117,788,677, set in 1940 (see table 2).

These totals probably would be increased more than 25 percent if the value of livestock fattened on Reclamation projects, and of dairy and poultry products were included. The gross values are also exclusive of returns from two supplemental water projects.

The over-all cultivated acreage rose from 3,380,460 in 1941 to 3,877,072 in 1942. Most of this increase was due to the inclusion of 410,768 acres in the Imperial Valley of California. On projects that were constructed entirely by the Bureau, and on projects that were furnished supplemental storage water from Bureau works, the cultivated acreage totaled 2,670,421 and crop values, \$193,783,707 (including Imperial Valley returns). These totals compare with 1941 figures of 2,178,288 acres and \$110,399,807. The cultivated acreage under special and Warren Act contracts, which receive supplemented water from Bureau works, rose from 1,202,172 in 1941 to 1,206,651 in 1942 and the crop values from \$49,486,191 to \$78,264,809.

Farmers on Bureau of Reclamation projects produced large quantities of war crops, including an estimated 2,841,162 bushels of dry

edible beans, 27,329,085 bushels of white potatoes, and 2,744,970 tons of alfalfa. Translated into annual supplies for civilians, this production would supply beans for 22 million persons, potatoes for 13 million, and, through alfalfa for beef and dairy herds, beef for 4½ million persons and milk for 3¾ million.

In 1942 the area planted to sugar beets was 138,407 acres, an increase of 37,188 acres over 1941. The production was 1,775,559 tons—a record output and indicative of the response of Reclamation farmers to appeals for meeting the national sugar shortage. The yield per acre was lower than the yields of previous years, due primarily to inadequate labor. In the spring of 1943 an average decrease of 29.6 percent in beet acreage planted was reported from 24 projects due to labor and price conditions.

Other crops that are grown on Reclamation projects include fruit and nuts, vegetables, small grains, long-staple cotton, flax, hops, and seeds.

Due to war conditions no new land was opened to entry on the projects during the year.

	Federal irrigation projects ¹			Warren Act lands			Total crop value			Total crop value		
	Irrigated acreage	Net area in cultivation	Total crop value		Irrigated acreage	Net area in cultivation	Total crop value		Irrigated acreage	Net area in cultivation	Total crop value	
			For year	Cumulative total			For year	Cumulative total			For year	Cumulative total
1506	22,300	2,169,000	244,900	\$5,005,360	---	---	---	---	127,300	2,200,100	\$244,900	---
1507	187,628	1,691,000	4,760,460	12,641,248	---	---	---	---	187,628	2,169,000	4,760,460	\$5,005,360
1508	289,549	2,500,500	7,635,888	24,641,911	---	---	---	---	289,549	2,500,500	7,635,888	12,641,248
1909	410,628	3,661,500	11,920,663	37,506,550	---	---	---	---	410,628	3,661,500	11,920,663	24,641,911
1910	471,423	4,133,000	12,944,639	50,592,991	---	---	---	---	471,423	4,133,000	12,944,639	37,506,550
1911	562,311	4,700,100	13,086,441	66,600,125	---	---	---	---	562,311	4,700,100	13,086,441	50,592,991
1512	614,477	5,400,000	16,007,134	82,276,534	---	---	---	---	614,477	5,400,000	16,007,134	66,600,125
1913	694,142	6,337,227	15,676,409	98,752,051	---	---	---	---	694,142	6,337,227	15,676,409	82,276,534
1914	761,271	7,034,424	16,475,517	116,916,503	---	---	---	---	761,271	7,034,424	16,475,517	98,752,051
1915	810,649	7,600,035	18,164,452	146,742,475	---	---	---	---	810,649	7,600,035	18,164,452	116,916,503
1916	922,821	8,588,231	32,815,972	206,194,788	---	---	---	---	922,821	8,588,231	32,815,972	146,742,475
1917	1,026,663	9,666,784	66,821,396	273,016,184	---	---	---	---	1,026,663	9,666,784	66,821,396	206,194,788
1918	1,119,566	1,051,193	88,974,137	361,930,321	---	---	---	---	1,119,566	1,051,193	88,974,137	308,016,184
1919	1,187,235	1,113,469	96,821,337	458,751,658	---	---	---	---	1,187,235	1,113,469	96,821,337	404,572,993
1920	1,223,480	1,153,820	66,171,650	498,161,971	---	---	---	---	1,223,480	1,153,820	66,171,650	470,744,623
1921	1,267,500	1,157,600	49,630,300	477,782,271	---	---	---	---	1,267,500	1,157,600	49,630,300	520,374,923
1922	1,202,130	1,169,100	50,360,850	528,143,121	---	---	---	---	1,202,130	1,169,100	50,360,850	570,735,773
1923	1,213,700	1,173,870	65,046,300	593,189,421	---	---	---	---	1,213,700	1,173,870	65,046,300	635,836,073
1924	1,230,860	1,216,610	66,488,500	659,677,921	---	---	---	---	1,230,860	1,216,610	66,488,500	702,364,573
1925	1,230,300	1,242,750	77,608,880	737,286,801	---	---	---	---	1,230,300	1,242,750	77,608,880	780,000,000
1926	1,411,020	1,328,810	60,369,620	797,656,421	---	---	---	---	1,411,020	1,328,810	60,369,620	840,369,641
1927	1,378,950	1,326,810	70,585,450	868,241,931	---	---	---	---	1,378,950	1,326,810	70,585,450	910,955,381
1928	1,442,080	1,385,560	80,238,800	948,480,731	---	---	---	---	1,442,080	1,385,560	80,238,800	991,219,531
1929	1,483,900	1,420,070	87,559,670	1,036,040,401	---	---	---	---	1,483,900	1,420,070	87,559,670	1,078,800,201
1930	1,504,810	1,467,097	94,418,940	1,130,459,341	---	---	---	---	1,504,810	1,467,097	94,418,940	1,173,219,141
1931	1,522,718	1,462,565	40,121,089	1,170,580,430	---	---	---	---	1,522,718	1,462,565	40,121,089	1,213,340,230
1932	1,555,144	1,506,320	31,165,752	1,201,746,182	---	---	---	---	1,555,144	1,506,320	31,165,752	1,244,505,982
1933	1,589,770	1,529,903	48,138,576	1,250,884,758	---	---	---	---	1,589,770	1,529,903	48,138,576	1,292,644,558
1934	1,552,124	1,464,405	59,628,377	1,310,513,135	---	---	---	---	1,552,124	1,464,405	59,628,377	1,352,272,935
1935	1,640,536	1,604,166	63,601,663	1,374,114,801	---	---	---	---	1,640,536	1,604,166	63,601,663	1,415,874,601
1936	1,702,192	1,629,174	78,902,818	1,453,027,619	---	---	---	---	1,702,192	1,629,174	78,902,818	1,494,782,419
1937	1,725,463	1,700,969	72,863,649	1,525,891,268	---	---	---	---	1,725,463	1,700,969	72,863,649	1,567,655,868
1938	1,777,584	1,764,363	67,859,804	1,593,751,072	---	---	---	---	1,777,584	1,764,363	67,859,804	1,635,515,672
1939	1,922,868	1,903,269	73,769,654	1,667,520,726	---	---	---	---	1,922,868	1,903,269	73,769,654	1,709,285,326
1940	2,152,808	2,138,927	80,048,196	1,747,568,922	---	---	---	---	2,152,808	2,138,927	80,048,196	1,789,333,522
1941 ²	2,199,179	2,178,288	110,399,806	1,857,968,728	---	---	---	---	2,199,179	2,178,288	110,399,806	1,899,733,328
1942 ³	2,277,955	2,259,653	155,619,716	1,983,588,444	---	---	---	---	2,277,955	2,259,653	155,619,716	2,055,353,044

¹ Includes projects constructed by the Bureau of Reclamation and those for which supplemental water is furnished from storage works built by the Bureau.

² Estimated.

³ Does not include project acreage and returns from All American Canal (Imperial Valley) and 5 supplemental water projects.

⁴ Does not include project acreage and returns from All American Canal (Imperial Valley) and 2 supplemental water projects.

CONSTRUCTION ACTIVITIES CURBED

The War Production Board, late in 1942, ordered construction halted on all Reclamation projects excepting power installations on five projects, Parker Dam, Boulder Dam, Columbia Basin (Grand Coulee), Colorado-Big Thompson (Green Mountain Dam), and Central Valley (Shasta Dam and the Shasta-Oroville transmission line). Inability to obtain critical materials previously had greatly limited construction.

Cognizant that the future food demands of the Nation would exceed its current agricultural production capacity, the Bureau waged a vigorous campaign throughout the remainder of the fiscal year to bring about cancellation of the stop-construction orders.

Appeals were made to the Facility Review Committee of the War Production Board. As a result, additional work was permitted to proceed under specified limitations on certain facilities of the following irrigation and municipal water projects:

Gila (Arizona): 5,500 acres for the production of guayule rubber.

Shirley and Terry units, Buffalo Rapids No. 1 project (Montana): where facilities, which would serve 8,150 acres, were nearing completion.

Yakima-Roza project (Washington): where facilities, which would serve 5,000 acres, were nearing completion.

Buford-Trenton project (North Dakota): where facilities, which would serve 14,800 acres, were nearing completion.

Gooding Division of the Minidoka project (Idaho), Tule Lake Division of the Klamath project (Oregon-California), and Heart Mountain Division of the Shoshone project (Wyoming): to provide employment for Japanese evacuees.

Mancos project (Colorado), Rapid Valley project (South Dakota), and Deschutes project (Oregon): to provide employment for conscientious objectors in Civilian Public Service Camps.

Lugert-Altus project (Oklahoma): construction of Altus Dam to a height sufficient to provide a supplemental supply of water for the city of Altus near which a large military activity is located.

Provo River project (Utah): enlargement of the Weber-Provo Canal to bring industrial water to a new steel plant.

Plans were under way to complete Friant Dam by installing control valves borrowed from Boulder Dam, and the Madera Canal, two features of the Central Valley project (California). These features were given clearance by the War Production Board. Two power plants, at Parker Dam on the Colorado River and Green Mountain Dam of the Colorado-Big Thompson project (Colorado), were com-

pleted. Excavation of two major tunnels was continued until late in December when stop-construction orders went into effect. They were the 13-mile Continental Divide tunnel (Colorado-Big Thompson project) and the 6-mile Duchesne tunnel (Provo River project, Utah).

Action of the Rubber Director in reducing the scope of the guayule program, resulted in adjustments of the plans for construction on the Gila project. The acreage to be served was increased from 5,500 to 8,500 acres for dust control in the vicinity of the Yuma air base, and for the production of alfalfa for livestock feed.

Construction at the end of the year remained at a standstill or was restricted because of War Production Board orders (exclusive of power installations) on the following projects: the Coachella Branch of the All-American Canal (California); the Friant-Kern Canal of the Central Valley project; Mirage Flats (Nebraska); Tucumcari (New Mexico); Eden, Kendrick, and Riverton (Wyoming); Davis Dam (Arizona-Nevada); Anderson Ranch Dam and Payette Division, Boise project (Idaho); Buffalo Rapids No. 2 (Montana); Provo River (Utah); and Columbia Basin (Washington).

WATER CONSERVATION PROGRAM PROGRESSES

Construction proceeded on 8 projects under the Water Conservation and Utilization program, the purpose of which is to stabilize agricultural production and employment in the Great Plains and similar areas suffering periodic droughts. One of the projects, Buffalo Rapids No. 1 (Montana), under which 15,500 acres of land were brought into cultivation, was completed. Water was delivered for the first time on the Buford-Trenton project (North Dakota) this spring, to 9,000 acres. This acreage may be expanded to 14,800 during the year.

The 8 projects when completed will irrigate 94,000 acres of land and will benefit nearly a million acres of range land valuable for the support of livestock. In addition to the above two, the projects in this program are: Eden (Wyoming), Rapid Valley (South Dakota), Newton (Utah), Mirage Flats (Nebraska), Buffalo Rapids No. 2, (Montana), and Mancos (Colorado).

Construction progress was seriously retarded by the disbandment of the Civilian Conservation Corps and the Work Projects Administration which had contributed nonreimbursable labor for construction. Stop-construction orders of the War Production Board relating to six of the projects brought work to a halt. These were issued late in 1942 and were in effect for the remainder of the fiscal year.

On June 24, 1943, President Roosevelt authorized construction of the Scofield project (Utah) for flood control. A new earth-fill dam, which

will also provide irrigation water to 12,500 acres of land, is to be constructed.

Fifty-two Projects in 41 Years

One hundred and sixty-seven dams and 30 power plants have been constructed by the Bureau of Reclamation in connection with the construction of 52 irrigation or multiple-purpose projects since the passage of the Reclamation Act of 1902. In addition, the Bureau has built 5,822 miles of transmission lines, 5,106 miles of ditches and drains, 210,487 canal structures, 14,357 bridges, 23,401 culverts, 6,498 flumes, 381 tunnels totaling 108 miles in length, 2,290 miles of pipe, and 4,208 miles of road. In building these structures 611,560,346 cubic yards of earth and rock were excavated and 33,203,253 cubic yards of concrete (containing 37,310,546 barrels of cement) were placed.

Shasta Dam Nears Completion

Shasta Dam on the Sacramento River, dominant structure of the vast Central Valley project (California) and one of the three largest concrete dams in the world, was 87 percent complete at the end of the fiscal year. Ultimately to be higher than Grand Coulee and more massive than Boulder, Shasta will contain 5,556,667 cubic yards of concrete. The first crest block was poured in April.

Two of five generators, each rated at more than 70,000 kilowatts, are being installed and will be ready for commercial production by March 1944.

Stop-orders which the War Production Board issued late in 1942, affecting Friant Dam, Keswick Dam, and the Madera Canal, all prominent features of the Central Valley development, were modified late in the fiscal year. Concrete work was resumed on Keswick Dam, to bring it to full height and to complete the powerhouse building. The Bureau advertised for bids on the Madera Canal construction and plans were completed for borrowing three 84-inch needle valves from the Boulder Dam outlet works for installation at Friant Dam to control diversion of the river's flow to the irrigation canal system.

Yakima-Roza Developed Rapidly

Irrigators on the Roza division of the Yakima project (Washington) kept ahead of canal construction in preparing their land for cultivation. Many planted their crops before their farm ditches were completed. About 14,000 acres of land had been brought into production. Plans were under way to bring 18,500 acres under irrigation during 1944 following a recommendation of the War Food Administration for resumption of work on the project.

FIELD INVESTIGATIONS ON WARTIME BASIS

The project planning activities of the Bureau of Reclamation since 1941 have been geared to war and post-war considerations. The investigation and study of the land and water resources of the 17 western states is preliminary to the preparation of plans for the development of irrigation and multiple-purpose projects, including power installations.

Studies and investigations by the Bureau cover entire river basins and their subdivisions, followed by studies and investigations of individual projects fitting into the pattern of an economic basin development. This avoids the haphazard construction of individual projects without consideration of each region as a whole.

Investigations in the upper Missouri River states are representative of basin-wide studies. These extend from the headwaters in Montana and Wyoming to Yankton, S. Dak., and to the subbasins of the Platte and Republican Rivers. As a result of the data assembled, Commissioner Page in October 1942 proposed that the Missouri River Basin states seek the consent of Congress to negotiate a compact dividing the waters of the river in the best interests of the inhabitants of the area for irrigation, power, flood control, and navigation. A Missouri Basin states committee was formed at Omaha in May 1943 to further the development of the river.

During the fiscal year the investigations had two major objectives. The first was the extension of irrigation to increase food production. The second was the development of a shelf of projects for inclusion in a comprehensive post-war public works program.

During the year, 150 irrigation and multiple-purpose projects and 38 river basins and subbasins were actively under investigation.

Progress on 35 projects warranted their being listed as desirable for immediate construction as part of the war food production program. On 41 others, field work and studies were advanced to the point where immediate preparation of construction plans for post-war execution was scheduled. Projects not approved for construction because they would not produce food in sufficient quantities in time to aid the prosecution of the war and others whose feasibility has been determined can be included in the post-war reserve.

With the objective of providing additional electric power for vital war production in the West, final reports were completed on 3 power projects and detailed surveys continued on 8 others. Preliminary reports on 27 developments, including the above 11, were completed in fiscal year 1942.

In addition to the foregoing activities the Bureau also reviewed flood control reports of the Corps of Engineers, War Department, in

numerous stream basins in California. This work is being carried on under the terms of an agreement dated August 14, 1939, by which the Bureau of Reclamation, the Corps of Engineers, and the Department of Agriculture interchange information on multiple-purpose projects. This coordination and cooperation provides for maximum utilization of water resources of each region.

POST-WAR PROGRAMMING IN PROGRESS

At the end of the war, providing employment opportunities for returning service men and emergency industrial workers will be one of the Nation's greatest responsibilities. Recognizing that the solution of this grave problem is dependent on advance preparations, the Bureau continued the development of a post-war public works program involving construction of 150 to 200 irrigation and multiple-purpose projects.

The program would provide 3 billion man-hours of work—equivalent to 3 years employment for 480,000 men. Tentative estimates place the construction cost at about 3 billion dollars.

Projects which are not completed as part of the war food program will be added to the post-war reservoir. As rapidly as current investigations can be carried out without impeding the Bureau's war activities, the list of projects will be enlarged.

In addition to providing employment, the program will prove a stabilizing influence in western economy. It will extend the Bureau's irrigation service to 15,000,000 acres of land. Settlement opportunities will be provided on newly irrigated land for 125,000 farm families. By supplementing existing irrigation supplies the Bureau will make it possible to settle 40,000 additional families on land now inadequately irrigated. Through the construction of hydroelectric installations, 3,300,000 kilowatts of new power can be provided.

Special Studies Advanced

To assure the best results from irrigation facilities under construction or proposed, the Bureau advanced special studies directed at agricultural and other economic problems on three projects.

An interim report was in preparation on the Columbia Basin Joint Investigations, inaugurated in connection with the large area to be irrigated in Washington from Grand Coulee Dam. This report will outline a program for the development and settlement during the post-war period of lands which cover an area larger than the State of Delaware.

Progress was made on the Central Valley Project Studies which were announced in 1942 as a means of assuring the best results from the construction in California of the most complex multiple-purpose project the Bureau has undertaken. As in the Columbia Basin Joint Investigations, many Federal and State agencies are participating.

The Yuma Mesa (Gila project, Arizona) Predevelopment Committee continued its plans for launching a large scale demonstration of the productivity of desert mesa lands under irrigation. The Appropriations Committee of the United States Senate on June 17, 1943, reaffirmed recommendations for this work. In approving a dust control program for the project to protect a nearby Army airbase, the committee urged alfalfa production for war food purposes. It also directed that the Bureau should seek to obtain the greatest permanent benefit possible from the wartime activities on this and other projects.

Structures Protected Against Sabotage

Approximately 650 Federal guards continued to protect vital Reclamation dams, power plants, and irrigation structures where saboteurs might strike. Vigilance was maintained on a 24-hour basis. Flood lights, steel fences, and other protective devices aided the officers.

Laboratory Streamlines War Work

Faster construction methods and the use of alternative designs and substitute materials resulted from the activities of the Bureau's engineering laboratories in Denver toward solving problems introduced by the shortage of manpower and strategic materials.

The laboratory facilities served the Bureau's needs and were used extensively by other agencies of the Government. These included the War and Navy Departments, the Maritime Commission, the War Production Board, the Public Roads Administration, the Tennessee Valley Authority, and the Panama Canal.

TABLE 3.—Settlement and economic data, 1942

State	Project	Irrigated farms		Towns on or tributary to the project		Number of schools	Number of churches	Banks		Special Warren Act contractors			
		Number	Population	Number	Population			Number	Deposits				
Montana-North Dakota.	Regular	Salt River.....	13,158	42,000	12	144,500	96	157	7	126,372,773	69,273	1,110	5,142
		Yuma.....	1,945	3,153	5	12,312	13	27	1	2,072,841	2,293		
		Arizona-California.....	676	1,900	1	1,366	6	9	1	1,549,737	2,094	814	1,628
		Grand Valley ¹	951	2,662	6	19,950	17	40	3	4,720,020	6,700		
		Uncompagre.....	1,715	5,335	3	7,936	28	35	4	5,880,460	28,400	3,334	12,068
		Boise.....	4,106	16,100	16	51,350	118	130	4	27,690,923	11,300	11,161	50,674
		Minidoka ⁴	3,542	12,049	10	14,514	35	74	6	10,913,385	5,341		
		Bitter Root.....	335	1,238	6	4,000	18	13	4	3,073,074	220		
		Premontown.....	42	180	1	110	1	1		170,140	350		
		Irmitley.....	653	1,893	5	672	7	6	1	271,678	8,339		
Montana-North Dakota.	Lower Yellowstone.	Milk River.....	566	2,257	15	12,117	31	39	7	9,839,288	8,883		
		Sun River.....	1,015	2,763	5	818	11	15	1	486,498	15		
		Lower Yellowstone.....	690	2,492	7	4,280	18	22	3	2,970,930	4,365		
		North Platte.....	3,172	9,364	16	27,313	73	67	9	16,057,396	16,575		
		Newlands.....	579	2,659	4	2,395	16	13	1	2,260,000	2,540		
		Carlsbad.....	442	2,062	4	19,400	14	20	2	4,666,669	5,350		
		Rio Grande.....	6,004	22,754	40	134,020	87	183	6	74,926,647	42,642	122	974
		Umatilla.....	430	1,568	4	2,800	7	12	1	1,963,961	1,900	33	68
		Vale.....	532	1,763	4	1,333	8	14	1	1,128,519	1,250		
		Klamath.....	959	2,741	6	28,084	30	35	5	3,425,274	1,680	500	1,250
Oregon-California.	Belle Fourche.	Owyhee.....	1,490	5,403	8	14,990	28	27	5	17,420,197	8,250	220	924
		South Dakota.....	650	2,092	5	3,730	22	15	3	4,002,000	5,795		
		Utah.....	2,000	8,900	13	18,490	28	31	4	5,655,708	11,215		
		Okanogan.....	424	913	3	4,920	28	31	2	2,251,233	2,900		
		Yakima.....	5,489	16,617	24	44,313	79	82	7	12,000,365	14,506	4,400	18,589
		Kendrick.....	0	0	7	19,500	17	19	2	14,082,333	11,000		
		Riverton.....	500	1,793	3	2,668	4	16	1	1,182,000	1,500		
		Shoshone.....	1,034	2,743	5	2,271	3	14	1	1,395,190	1,500		
		Subtotal.....	53,121	175,414	238	600,152	823	1,123	93	351,437,429	281,282	21,703	91,317

Project Operators Increase Food Output

Increased production of critical foodstuffs to meet expanding demands resulted from the activities of the Division of Operation and Maintenance, with headquarters in Denver. Results were achieved by urging farmers to cultivate small undeveloped tracts of holdings, and by encouraging them to shift from less essential to more important war crops.

Cooperative arrangements were continued with the Farm Service Administration, which extends financial assistance to settlers on undeveloped Reclamation areas, including Water Conservation and Utilization projects, and with the Extension Service of the Department of Agriculture, whose agricultural specialists assist farmers in matters on new Bureau developments.

As part of the Bureau's educational program, a new film "Better Pastures" was completed and released. This and other movie lectures, and circulars, designed to assist farmers in making the most economical use of available water supplies, in preventing soil erosion, and in eradicating noxious weeds, were widely distributed during the year among farmers and local organizations on the West, and in communities of the West.

Reclamation Lands Leased

More than 625,000 acres of public land (withdrawn by the Bureau in connection with completed or partially completed projects under investigation) were under lease at the end of the year. Approximately 580,000 acres are being grazed and 45,000 being utilized for crop production. In addition, approximately 100,000 acres of Reclamation withdrawn lands have been temporarily transferred to the Grazing Service for supervision in the carrying out of efficient range administration under the Taylor Grazing Act.

Soil and Moisture Problems Studied

Control of erosion and prevention of seepage in irrigation systems was the major activity under the Soil and Moisture Conservation program. Much field testing work was done on a number of projects in placing and testing various types of canal linings and in experimenting with different types of vegetation as soil retention measures. Programs previously initiated for better control and use of land were carried forward by means of demonstrations, experimentation in the laboratory and field studies.

Revised Repayment Contracts Negotiated

Eight amendatory repayment contracts were negotiated with water users' organizations under the Reclamation Act of 1939 which provides for adjustment of existing schedules according to the ability of water users to pay. Several other new contracts of 37 requested are in the stage of negotiation and approval. Due to present and anticipated augmented incomes, water users on several projects have indicated that there is no desire for early action on amendatory contracts. Approximately 200,000 acres on 11 irrigation projects are in progress of reclassification under the act of 1939.

Marked Decrease in Requests for Relief

Reflecting increased crop values over all Reclamation projects, the fiscal year 1943 saw a marked decrease in the number of applications received for relief from payment of accrued construction charges. Applications were submitted by 6 water users' organizations and 7 individuals, aggregating \$189,922.44. At the end of the year relief has been granted to 4 water users' organizations for a total amount of \$24,530.

In comparison, applications were received in the fiscal year 1942 totaling \$1,061,556 from 22 water users' organizations. Relief in the total amount of \$535,432.85 was authorized.

Japanese Evacuees on Three Projects

Thirty-six thousand persons of Japanese ancestry, evacuated from the Western Defense Zone on the Pacific Coast, occupied relocation centers on three projects. Camps of 10,000 persons each were completed and occupied early in the fiscal year on the Gooding division of the Minidoka project (Idaho), and on the Heart Mountain division of the Shoshone project (Wyoming). Sixteen thousand evacuees had moved into their temporary war quarters on the Tule Lake division of the Klamath project (Oregon-California) late in the previous fiscal year. The original plans contemplated that the evacuees would do much of the remaining construction work on these projects. Difficulties in obtaining critical materials and equipment made it necessary to limit activities to completion of irrigation facilities for an area considered adequate for the subsistence of the occupants of each center. Work on this restricted program was in progress during the year with several thousand acres under irrigation. The remainder of the acreage required will be developed during the next fiscal year.

The centers were constructed by the Army Engineers. The Bureau supervises the irrigation construction work done by the Japanese.

Civilian Public Service Building Dam

A moderate-sized earth-fill dam is being constructed on each of three projects under arrangements made with the Selective Service System for the establishment of three Civilian Public Service camps for conscientious objectors. These forces also clear the reservoir sites and participate in canal construction.

Camps were first occupied during the year on the Rapid Valley project (South Dakota) and on the Deschutes project (Oregon) with a religious organization responsible for the welfare of the men. A supervisory staff was assembled in June for a camp to be operated entirely by the Bureau of Reclamation on the Mancos project (Colorado). The first assignees to this camp are due in July 1943. At the end of the year 116 men were stationed at the Rapid Valley camp and 153 at the Deschutes camp.

C. C. C. and W. P. A. Disbanded

Operations on Reclamation projects of the Civilian Conservation Corps and the Work Projects Administration were terminated during the year.

All but seven C. C. C. camps had been closed by the end of fiscal year 1942. The remaining camps, located on Water Conservation and Utilization projects, were suspended by August 1, 1943. Although the war had greatly reduced the extent of the operations of the Work Projects Administration, it was not until early in 1943 that the order was given for its liquidation. The C. C. C. enrollees and the W. P. A. workers contributed construction labor on a nonreimbursable basis.

Under the act of July 2, 1942, the Bureau was required to participate in disposing of C. C. C. equipment, supplies, and buildings valued at many million of dollars most of which was transferred to the War and Navy Departments and the Civil Aeronautics Administration.

NEW LEGISLATION ENACTED

Two major pieces of legislation, the Columbia Basin Project Act and the Republican River Compact Consent, were enacted during the fiscal year. Another measure, presented late in the fiscal year, was the amendments to the Water Conservation and Utilization (Wheeler-

Case) Act, gearing the construction program carried out under that law to war needs.³

Columbia Basin Project Act Passed

In planning for the settlement and development of 1,200,000 acres on the Columbia Basin project (Washington), which is scheduled for construction, the Bureau encountered the difficult question of how to get the raw land to settlers at its reasonable value without speculative increment on account of prospective irrigation.

The prime purpose of the Columbia Basin Project Act (Public Law 8, 78th Cong., 1st Sess.) is to meet this problem squarely. It requires owners of land in excess of specified acreages to sell the excess acreage at the Government appraised values. Owners who dispose of any holdings within 5 years after water is available must sell at not more than the appraised values. Appraisals are based on dry land or pre-irrigated values.

Other basic purposes of the act are: (1) to reauthorize the project as one subject to the repayment principles of the Reclamation Act of 1939 (53 Stat. 1187); (2) to authorize the Secretary of the Interior to acquire, sell, exchange, or lease project lands and adjacent lands, to establish town sites, and to dedicate portions for public use, all in aid of and for the protection, development, or improvement of the project; (3) to anticipate local taxing problems, arising out of the acquisition of lands by the United States, by authorizing the payment, out of funds derived from the lease of these lands, of sums in lieu of taxes to the State of Washington or its political subdivisions.

Construction of the main pumping plant and balancing reservoir is authorized, but other work on the irrigation system must await execution of repayment contracts with the irrigation districts in which the project lands are located.

Consent to Republican River Compact

The Republican River Compact provides for the equitable apportionment of the waters of the Republican River and its drainage area among the three States of Colorado, Kansas, and Nebraska, thereby removing the basis for interstate litigation and laying the groundwork for the development of the water resources of the river basin.

The consenting legislation is noteworthy also in that, to conform to the compact, it provides for Federal consultation with state compact officials with respect to certain Federal programs or projects

³ This measure became Public Law 152, 78th Cong., 1st Sess., approved July 16, 1943.

and requires the Federal Government to respect certain established water rights as property.

Congress in 1942 gave its consent to a compact entered into by the three States allocating the waters of the river on an equitable basis, but the consent was vetoed by the President because of its potentially adverse effect upon Federal activities in the area.

Subsequently the states and representatives of interested Federal agencies met and revised the compact to meet the objections contained in the veto message. The legislatures of the three states meeting early in 1943 approved the compact and a bill to grant the consent of Congress became law on May 26, 1943 (Public Law 60, 78th Cong., 1st Sess.).

W. C. U. Amendments Proposed

To fit the construction of projects under the Water Conservation and Utilization program to the war food production program, amendments to existing legislation relating to these projects were drafted during the fiscal year.

The amendments authorize, for the duration of the war, the expenditure for project construction of appropriated funds in lieu of contributions of labor and materials formerly made by the defunct Work Projects Administration and the Civilian Conservation Corps. The law will permit using prisoners of war in the construction of projects, subject to regulation by the appropriate Federal agency.

The new legislation also will facilitate the speedy construction and administration of projects thus permitting quick expansion of productive acreage to meet the critical food shortage.

A wartime Reclamation Act (H. R. 3018), which seeks to permit the Bureau to speed the construction and operation of irrigation projects, was pending when the Congress recessed for the summer.

BUREAU DECENTRALIZATION PLAN COMPLETED

After long consideration, plans for decentralizing the Bureau of Reclamation to assure a full utilization of the land and water resources of the West to meet war and post-war requirements were completed during the year. Under the program,⁴ six major field offices, headed by Regional Directors of Reclamation who would be directly responsible to the Commissioner of Reclamation, would be established.

The reorganization plan, it is felt, will provide for a more thorough understanding of area problems and of the needs and potentialities of

⁴ The plan was put into effect on September 9, 1943.

each area than has been possible heretofore through the Washington, D. C., headquarters and Denver (Colo.) engineering office. It is proposed to establish regional offices at Boise, Idaho; Sacramento, Calif.; Boulder City, Nev.; Salt Lake City, Utah; Amarillo, Tex., and Billings, Mont.

The plan would also establish four branches with offices at Denver. These are: the Branch of Design and Construction, which will assume the design and construction responsibilities of the Office of the Chief Engineer at Denver; the Branch of Project Investigations, which will perform the work now done by the Project Planning Section of the Chief Engineer's office; the Branch of Operation and Maintenance, which will carry out the functions of the Operations and Maintenance Division, as presently constituted, for irrigation activities; the Branch of Fiscal and Administrative Management, which will assume the duties of the Office of the Chief Accountant, including the central accounting office, and those of the general clerical section of the Office of the Chief Engineer.

Military furloughs, transfers, and stop-work orders restricting construction reduced the number of Reclamation employees from 8,016 on June 30, 1942, to 6,543 on June 30, 1943. Twelve Washington office employees and 1,373 field employees were in the armed forces of the United States.

The number of field offices, exclusive of headquarters of project investigations, was reduced from 57 to 54.

The Bureau pay roll was segregated as follows: 5,623 employees engaged in construction or operation and maintenance on field projects; 773 in the field headquarters at Denver; 49 attorneys and clerical employees engaged in field legal work under the supervision of the Chief Counsel; and 98 employees in the Washington office, including the Commissioner, the Assistant Commissioner, and several who are detailed to other offices.

Commissioner Page Resigns

Due to ill health John Chatfield Page, Commissioner of Reclamation since January 25, 1937, resigned his position in June. His resignation was to be effective upon appointment of his successor. When his health permits, Mr. Page then will resume his active association with the Bureau as consulting engineer with headquarters at Denver. He first joined the Bureau early in 1909. After 2 years'

TABLE 4.—Accretions to Reclamation Fund by States

States	Sale of public lands		Proceeds from oil leasing act		Total to June 30, 1943
	Fiscal year 1943	To June 30, 1943	Fiscal year 1943	To June 30, 1943	
Alabama.....			\$31. 76	\$197, 604. 02	\$197, 604. 02
Arizona.....	\$2, 604. 23	\$2, 766, 339. 36	1, 451. 71	6, 303. 95	2, 772, 643. 31
California.....	1, 971. 84	8, 304, 067. 84	1, 062, 995. 24	21, 722, 351. 47	30, 026, 419. 01
Colorado.....	3, 531. 91	10, 326, 330. 20	107, 827. 88	1, 104, 787. 40	11, 431, 117. 60
Idaho.....	3, 350. 40	7, 058, 097. 58	128. 64	22, 374. 93	7, 080, 472. 51
Kansas.....		1, 033, 601. 40	3, 391. 28	10, 206. 82	1, 043, 803. 22
Louisiana.....			11, 111. 94	332, 596. 76	332, 596. 76
Michigan.....			9. 19	56. 45	56. 45
Mississippi.....				110. 25	110. 25
Montana.....	1, 397. 12	15, 388, 624. 90	95, 404. 14	1, 631, 988. 61	17, 020, 613. 51
Nebraska.....	410. 45	2, 097, 698. 70	78. 75	330. 75	2, 098, 029. 45
Nevada.....	1, 960. 00	1, 042, 345. 90	577. 76	6, 191. 98	1, 048, 537. 88
New Mexico.....	519. 31	6, 742, 810. 30	579, 531. 45	4, 218, 905. 43	10, 961, 715. 73
North Dakota.....		12, 219, 646. 27	18, 786. 60	259, 194. 50	12, 478, 840. 77
Oklahoma.....		5, 931, 145. 58	1, 079. 55	7, 169. 32	5, 938, 314. 90
Oregon.....	376. 76	11, 995, 324. 73	105. 26	957. 28	11, 996, 282. 01
South Dakota.....		7, 733, 675. 48	6, 550. 46	19, 296. 72	7, 752, 972. 30
Utah.....	33. 56	4, 397, 539. 48	147, 567. 67	1, 131, 995. 80	5, 829, 535. 28
Washington.....	2, 242. 03	7, 475, 102. 22	1, 666. 45	43, 974. 71	7, 519, 076. 93
Wyoming.....	1, 652. 23	8, 722, 080. 55	1, 150, 413. 57	40, 644, 043. 15	49, 366, 123. 70
Total.....	20, 049. 54	113, 234, 430. 19	3, 218, 409. 30	71, 360, 440. 30	184, 594, 870. 49
Proceeds, Federal water power licenses.....					1 927, 307. 88
Proceeds, potassium royalties and rentals.....					1 1, 391, 465. 21
Receipts from naval petroleum reserves, 1920 to 1938, act of May 9, 1938.....					29, 778, 300. 23
Grand total.....					216, 691, 943. 81

¹ Proceeds for fiscal year \$33,463.43.

² Proceeds for fiscal year \$246,059.79.

Reclamation Fund Accretions

service in other fields, he returned in 1911 to serve continuously thereafter.

Accretions to the Reclamation Fund, created by the Reclamation Act of 1902 (table 4), brought the total cash available from this source in 41 years to \$216,691,943.81. Collections—construction and operation and maintenance repayments, water rentals, power, etc.—were \$148,346,928.86. Disbursements totaled \$344,595,311.90, leaving a balance in the fund on June 30 of \$20,443,560.77.

Construction repayments to the Reclamation fund during the year totaled \$3,116,583.23; operation and maintenance collections amounted to \$1,298,081.11; and water rental, power, and other receipts aggregated \$2,665,801.74.

The total collections, which are the highest with the exception of two years in the history of the Bureau, reflect the improved conditions of Reclamation farmers and their response to the President's anti-inflation policy through maintaining payments. The high level of the Reclamation fund provides a backlog of resources for the extension of irrigation when the resumption of construction is possible.

Federal Investment Increased

Expenditures for construction on all projects during the year totaled \$53,336,884.87 bringing the federal investment to \$870,105,474.92 (see table 5).

Due to war restrictions on construction of irrigation systems, the major expenditures were on facilities which would expedite the generation of power for war production. These expenditures, however, advanced the completion of facilities which will aid irrigation through additional storage. The power revenues for these installations will assist in financing the cost of irrigation systems.

Preliminary studies indicate that when the Reclamation construction program as laid out at the beginning of the war is completed, about 50 percent of the repayable costs will come from power revenues and approximately 45 percent from irrigation. The remaining costs will be allocated to nonreimbursable purposes—flood control, navigation, and contributed labor—or will be repayable by municipalities for supplemental water supplies.

For the fiscal year 1944, Congress appropriated \$21,044,000 for construction of irrigation facilities. With unexpended balances on June 30, 1943, this brings to \$54,745,450 the funds available for extending irrigation for war food production. New appropriations by Congress for power and multiple-purpose facilities, which will also aid irrigation, flood and salinity control, or navigation, totaled \$13,149,000. The unexpended balance for power and multiple-purpose facilities brings to \$55,340,200 the total available for construction of this type. The Bureau thus has available for the fiscal year 1944 a total of \$100,085,650 for construction purposes. Under existing war conditions, irrigation construction is subject to recommendations of the War Food Administration to the War Production Board and approval by the latter agency. Similarly, the construction of power facilities is governed by rulings of the War Production Board.

TABLE 5.—Consolidated summary statement of construction cost of reclamation projects ¹

	Construction cost		Operation and maintenance before public notice (net)		Operation and maintenance deficits and arrearsages and penalties		Construction revenues, contributed funds, and nonreimbursable appropriation		Abandoned nonreimbursable cost and authorized charge-offs		Total repayable	
	Fiscal year 1943	To June 30, 1943	Fiscal year 1943	To June 30, 1943	Fiscal year 1943	To June 30, 1943	Fiscal year 1943	To June 30, 1943	Fiscal year 1943	To June 30, 1943	Fiscal year 1943	To June 30, 1943
<i>Regular projects</i> ²												
Total	\$36,860,268.71	\$487,138,350.23	\$62,790.05	\$3,357,498.12	\$19,017.72	\$9,414,902.96	\$794,790.46	\$16,266,170.49	\$17,131,187.06		\$36,109,714.22	\$466,513,393.76
<i>Water conservation and utilization projects</i>												
Total	\$869,500.77	\$5,554,123.70	\$682.11	\$39,695.81							\$870,182.88	\$5,593,154.44
<i>Special projects</i> ³												
Colorado River Dam Fund: ⁴												
All-American Canal	\$324,067.33	\$32,097,714.58										
Boulder Canyon project	4,701,409.66	139,600,355.18										
Arizona:												
Davis Dam	685,466.00	1,053,259.85										
Parker Dam ⁵	24,027.84	6,779,055.31										
Parker Dam power	2,917,532.71	13,688,607.88										
Montana: Fort Peck	2,057.69	2,057.69										
Texas: Colorado River, Tex. ⁷	27,246.54	23,539,606.78										
Washington: Columbia Basin	7,027,856.38	160,652,343.72										
Total	15,607,115.39	377,413,000.99										
Grand total	53,336,884.87	\$70,105,474.92										

¹ Consolidated statement by individual projects available in mimeographed form at Bureau of Reclamation, Washington, D. C.

² Authorized under Reclamation law.

³ Multiple-purpose project; all costs repayable except when noted.

⁴ All costs repayable.

⁵ Reduction adjustment.

⁶ Funds advanced by Metropolitan Water District of Southern California.

⁷ Repayable costs not determined.

Office of Solid Fuels Administration for War

HOWARD A. GRAY, Deputy Administrator

EXPANSION of the United States war program has created enormous demands for coal with requirements keeping pace with the quickened tempo of armament production. Increased production has been required to fill the demands of industry, particularly steel, public utilities, railroads, and as raw material used in the manufacture of explosives, synthetic rubbers, plastics, medicines, and other essentials.

Shifts of population to war-production centers and the concentration of soldiers and sailors in training camps and naval stations brought increased demands for coal. Conversions of heating plants from petroleum to coal also contributed to the necessity for a greater supply of coal.

Increased requirements have been accompanied by changes in the distribution pattern and difficulties in meeting demands were accentuated by acute manpower and equipment shortages, and by labor disturbances.

Three general coal mine strikes resulted in reducing the amount of coal produced by approximately 25,250,000 tons.

By Presidential Executive order on May 1, the Secretary of the Interior took possession and control of mines producing 50 tons or more per day, on which work stoppages or strikes had occurred or were threatened. The Solid Fuels Administration directed operation of the mines until the end of the fiscal year, when this task was turned over to the newly-organized Coal Mines Administration.

During the year essential demands for coal were supplied and the largest protective stock piles in the history of the industry were built. Production of bituminous coal reached record heights and anthracite output was the largest since 1930.

Deficiencies in the production of certain types and sizes of coals, uneven distribution of protective stocks and increasing requirements in certain areas were recurrent problems requiring constant attention.

Establishment of the Solid Fuels Administration for War followed issuance of Executive Order No. 9332 on April 19, 1943, designating the Secretary of the Interior as Administrator. The new organization absorbed the personnel and the records of the former Office of Solid Fuels Coordinator, which had been set up by Presidential request on November 5, 1941.

The Executive order granted definite authority while the former office had been empowered only to recommend and advise.

Within a few weeks after its establishment, the new authority was exercised in meeting the complex problems raised by the strikes and the Government's control of the mines. These were handled expeditiously through an organization which was assembled with the cooperation of the Bituminous Coal Division and the Bureau of Mines.

Through its organization of the coal industry in the previous fiscal year and with the assistance of the Solid Fuels Advisory War Council, the Office keyed the Nation's coal program to the estimated requirements for 1943. Based on careful studies it estimated 1943 production requirements for bituminous coal at 600,000,000 tons and for anthracite at approximately 65,000,000 tons.

These figures represented increases of 20,000,000 tons over preliminary 1942 bituminous output estimates (which exceeded the previous record of 1918) and about 5,000,000 tons above 1942 anthracite production.

The heavy 1942 production was made possible by a coal-stocking campaign which the Office pressed vigorously to provide an outlet for mine output during the normally slack summer months. By December 1, despite increasing consumption, bituminous stocks were approximately 90,874,000 tons, about 15,000,000 tons above the previous 1927 record. Total anthracite stocks were also believed to be above normal.

While rising consumption cut bituminous stocks during the winter, at the end of the fiscal year stocks were estimated at 74,028,000 tons, a substantial cushion against emergencies which might arise. These stocks however, were unevenly distributed, with wide differences between individual consumers and classes of consumers.

In cooperation with the Office of War Information, other Government agencies, railroad and industry groups, we carried out a Nation-wide campaign to stimulate early ordering of coal.

National radio commentators and radio stations cooperated in the campaign which, because of the tight supply in anthracite, was definitely directed to bituminous coal consuming areas.

The Office of War Information disseminated material relating to the campaign through all media.

The Administration, through the Department of the Interior Radio Section, prepared and distributed radio records which carried the Order-Coal-Now message. These were distributed free to retail coal dealers and other participants in the campaign, and were used on radio advertising programs. The radio time in all cases was paid for by the campaign participants.

Cooperation with civic groups has been freely given and the advice of the Administration has been sought by organized retail groups, civic committees and newspapers interested in the campaign.

Public response to the campaign was reflected in the increased number of orders reported by coal dealers.

The major problems of the coal industry—manpower and equipment shortages—increased during the year in spite of every effort at their solution. Estimates indicated a net loss of upwards of 60,000 miners in 1942, and these losses to the armed services and industry were continuing in 1943. Manpower losses likewise hampered retail distribution, restricting its capacity.

While the Solid Fuels Office repeatedly brought the manpower situation to the attention of the War Manpower Commission and the Selective Service System in an effort to halt or retard the critical drain on the industry, marked losses in potential capacity for production and distribution were directly traceable to heavy labor turn-over.

The coal supply would have been further reduced except for the establishment of the 42-hour, 6-day week, in the mines which was instituted at the behest of the Office.

Earlier, labor, at the request of the Solid Fuels Coordinator, relaxed restrictions against Sunday and holiday overtime work in mines in Oregon, Washington, Wyoming, Utah, Colorado, and New Mexico.

The Office collaborated closely with the War Production Board in providing equipment and materials for mining operations. Likewise, it worked with the Reconstruction Finance Corporation which furnished financial assistance for many of these purchases and for the extension of mining operations.

Close collaboration with the Office of Defense Transportation, the War Shipping Administration, and the Association of American

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Within a few weeks after its establishment moves by the exercised in meeting the complex problem of rail haul to large the Government's control of the mine movement. Because of conditionally through an organization Fuels Office was opened cooperation of the Bituminous Coal

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These figures represented preliminary 1942 bituminous previous record of 1918) and cote production.

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In cooperation with government agencies, rail wide campaign to

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operation and its predecessor has been a reliable coal for the manufacture of the industry. A field agent was assigned in maintaining a constant flow of the which supplemented the output of by-product and additional sources of this coal were contributed to maintaining continuous

pressure was exerted on byproduct coke plants to coal year 1943-44. The Office assisted them and induced the industry generally to build up wisdom of this policy was demonstrated during great loss of coke output and consequently of

In conjunction with the Bureau of Mines, the Office production committee, representing the coke-making work was done by this committee in investigating limiting pig-iron production and in developing a plan to increase pig-iron output by an estimated average of 100,000 tons daily.

In view of current trends, the Office instituted and elaborated through the Economics Branch of the Bituminous Coal Commission these were:

1. A survey of consumption stocks and days' supplies of 18,000 manufacturers and a similar report from 15,000

2. A survey of mine manpower, covering employment, critical additions, separations, and labor needs.

3. Daily reports from all river and rail connected mines of more than 100 tons daily capacity showing production, number of days' operations, shifts and time and tonnage lost due to "no orders."

4. In response to the Office's request, the Bureau of Mines instituted anthracite production studies, and forms for gathering these statistics were made ready for use at the year's end.

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The heavy 1942 production was made possible by a coal-stocking campaign which the Office pressed vigorously to provide an outlet for mine output during the normally slack summer months. By December 1, despite increasing consumption, bituminous stocks were approximately 90,874,000 tons, about 15,000,000 tons above the previous 1927 record. Total anthracite stocks were also believed to be above normal.

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While the Solid Fuels Office repeatedly brought the manpower situation to the attention of the War Manpower Commission and the Selective Service System in an effort to halt or retard the critical drain on the industry, marked losses in potential capacity for production and distribution were directly traceable to heavy labor turn-over.

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Railroads facilitated the movement of coal and in many instances averted serious disruption of industrial activity.

The greater volume of coal and longer rail hauls have put increased strain upon the railroads' car supply in spite of efforts to speed "turn-around" time and increase car loadings.

Three general areas, where transportation has caused problems, are:

1. New England, where increased requirements have arisen from war industries and because of fuel-oil conversions. Normally this area received most of its coal by tidewater colliers. Submarine activity and diversion of colliers necessitated a greater movement by rail. Now the bulk of the region's coal moves by the long all-rail haul direct from the mines or by a long rail haul to barge terminals where it is transhipped for water movement. Because of the special problems of New England, a Solid Fuels Office was opened in Boston in December 1942.

2. The Great Lakes area, which is served by coal cargo vessels, and especially the Lake Superior and west bank of Lake Michigan regions, which are virtually inaccessible to coal moved by rail. The delayed opening of lake navigation in 1943, coupled with serious loss of tonnage because of strikes, put shipments far behind schedule. As the fiscal year ended, every effort was being put forth to move more coal to the upper lake docks, which had been drained by the long severe winter of the usual "carry-over" stocks.

3. The Pacific Northwest States of Washington, Oregon, and Idaho, where coal requirements had increased sharply due to conversions from other fuels, influx of population, and new war industries. Simultaneously, manpower losses reduced the production of Rocky Mountain and Pacific Northwest mines. A Solid Fuels Office was opened at Seattle in September to keep in close touch with the situation. During the winter, the area's inadequate fuel supply was supplemented by approximately 225,000 tons of eastern coal hauled from the Lake Superior docks by railroad. Lend-lease coal requirements added to the burden in the Northwest.

The most troublesome problem in the fiscal year was in meeting the needs of anthracite users in the Eastern States. Because of spring floods in 1942, production was behind schedule and maldistribution of the output resulted in orders piling up and customers clamoring for coal throughout the season. During January a series of strikes cut production approximately 500,000 tons and at the request of the Solid Fuels Coordinator the industry temporarily suspended anthracite shipments outside of the area until the emergency had passed.

In an endeavor to step up production, the Office assisted War Production Drive Headquarters in conducting a production drive in the anthracite and certain bituminous mines.

However, continuing tightness of the anthracite supply through the spring months, added to the losses of production in the strikes of January, May, and June, necessitated the institution of a temporary anthracite distribution program in June which provided for the equitable distribution of the available supply until a permanent program could be developed.

A major activity of the Administration and its predecessor has been to assure a constant supply of suitable coal for the manufacture of coke used in the iron and steel industry. A field agent was assigned to the Connellsville region to aid in maintaining a constant flow of the proper coals to beehive ovens which supplemented the output of by-product coke plants. New and additional sources of this coal were explored. These activities contributed to maintaining continuous operations of the beehive ovens.

Last November influence was exerted on byproduct coke plants to make fuel contracts for the coal year 1943-44. The Office assisted them in obtaining this coal and induced the industry generally to build up larger stock piles. The wisdom of this policy was demonstrated during the strikes when a great loss of coke output and consequently of steel was averted.

In July 1942, in conjunction with the Bureau of Mines, the Office formed a coke production committee, representing the coke-making industry. Valuable work was done by this committee in investigating the coke problems limiting pig-iron production and in developing a program designed to increase pig-iron output by an estimated average of 50 tons per blast furnace daily.

To keep abreast of current trends, the Office instituted and elaborated various surveys through the Economics Branch of the Bituminous Coal Division. Among these were:

a. A monthly survey of consumption stocks and days' supplies of fuel used by 18,000 manufacturers and a similar report from 15,000 coal dealers.

b. Studies of mine manpower, covering employment, critical shortages, additions, separations, and labor needs.

c. Weekly reports from all river and rail connected mines of more than 50 tons daily capacity showing production, number of days' operation, shifts and time and tonnage lost due to "no orders."

At the Office's request, the Bureau of Mines instituted anthracite distribution studies, and forms for gathering these statistics were almost ready for use at the year's end.

Various studies begun in the year covered other phases of the coal industry, including the more effective use of lake and river transportation.

Besides handling problems as they arose, the Administration neglected no opportunity to prepare for future contingencies. Additional study was made of plans for the emergency distribution of coal in the event that developments might require such close control to ensure all essential needs being met.

Bituminous Coal Division

DAN H. WHEELER, Director

SINCE the Bituminous Coal Act of 1937, administered by the Bituminous Coal Division, expired August 23, 1943, it seems appropriate to appraise the agency's activities during the period from July 1, 1942, through August 23, 1943 (for the purpose of this report referred to as the fiscal year) in the light of the over-all objectives of the act.

Conceived in peacetime as legislation to remedy chronic economic distress in the bituminous coal industry, the statute proved to be an effective war measure and the Bituminous Coal Division readily adapted its activities to performance of direct and vital war work.

CONTRIBUTION OF BITUMINOUS COAL ACT TO WAR PROGRAM

The bituminous coal industry first experienced minimum price regulation under NRA. When the National Recovery Act was declared unconstitutional the price structure for coal became void, but hope of further stabilization by legislation was not abandoned. From 1935 until they became effective October 1, 1940, under the Bituminous Coal Act, minimum prices established by law seemed always imminent. The hope of ultimate statutory relief from their economic distress influenced many operators to remain in a business in which they were losing capital. Thus enough potential capacity remained after 15 years of continuous annual losses in the industry to permit rapid expansion of production to meet growing war requirements. This explains the ability of the industry to increase production from 461,000,000 tons in 1940 to 580,000,000 tons in 1942 and to attempt to reach a goal of 600,000,000 tons in 1943.

Freed from unfair competition through the operation of the act many months prior to the outbreak of war, the industry had been

able to undertake the development of mines necessary to reach the high production level demanded by the war. Orderliness established in the industry and the mechanism for its cooperation with a government agency which resulted from the Bituminous Coal Act helped expedite the handling of the Nation's wartime fuel problems.

Material assistance to many other departments of the Government, mostly in connection with war work, was provided by the Bituminous Coal Division, especially through the Economics and Marketing Branches. Frequently information made available by the routine administration of the act was processed to serve other agencies' needs. In many cases these branches used their trained personnel and existing machinery to make special inquiries. These wartime functions were essential, and with the expiration of the act, either must be discontinued or carried on by specially organized agencies.

The agencies served in this manner by these branches include the War Department, the Navy Department, the War Production Board, the War Labor Board, the Office of Economic Stabilization, the Office of Economic Warfare, the Bituminous Coal Consumers Counsel, the Solid Fuels Administration for War, the Coal Mines Administration, the Office of Price Administration, the Interstate Commerce Commission, the Maritime Commission, and many others. Each branch carried on this special war work together with a large volume of routine work in connection with the administration of the act.

OBJECTIVE OF THE BITUMINOUS COAL ACT

The Bituminous Coal Act was devised by the Congress to stabilize the bituminous coal industry by the equalization of weighted average costs of production with weighted average realizations in each of 10 minimum price areas described in the act. It was designed to achieve this balance without imposing upon the industry a rigidity of costs or a rigidity of prices; without insuring the industry a profit and without proscribing the opportunity for one.

Apparently many misconceptions prevailed as to the meaning of stabilization under the Bituminous Coal Act. As comprehended in this statute, stabilization meant preventing the deterioration of the operating positions of all companies, as a whole, within a price area, under the impact of a competitive price cutting which normally prevailed in the industry. However, stabilization as conceived in the act and competition were not incompatible. On the contrary the stabilization mechanisms under the act were designed to promote the

type of competition which would bring about an orderly outcome of affairs, and to prevent the type which wouldn't. Within the bounds prescribed by the act, it was intended that competition be fair, free, and unrestrained.

It should be observed that the act was designed to stabilize the relationship between costs and prices. The act did not require operators and miners to enter into wage contracts and did not preclude controversy between operators and miners. Its stabilization process began with the completed determination of labor costs and other costs whatever may have been the factors in determining them. Unquestionably it was hoped that the frequency and violence of labor disturbances would be among the effects of instability in the industry which would be lessened by controlling the causes, but the act could not eliminate the fundamental desire on the part of any groups to act in their own self-interest.

ACT OUTGROWTH OF LONG CONGRESSIONAL STUDY

The Bituminous Coal Act of 1937 was the outgrowth of a quarter of a century of investigations of the industry by Congress. These disclosed that the industry had suffered annual losses ranging into millions of dollars for at least 15 years prior to 1937. Indeed the whole history of the industry since shortly after the First World War was revealed as a long record of huge financial losses to investors with consequent widespread bankruptcies; lack of employment for miners with consequent impoverishment of entire mining communities; and a trend toward low wages with consequent strikes frequently accompanied by violence. The general instability of the industry was found to have led to price discrimination against smaller consumers and to the wasteful and ruthless exploitation of the Nation's bituminous coal resources.

Long studies of the industry made it apparent to the Congress that these unhealthy economic conditions had arisen as the outgrowth of competition based on price-cutting below cost levels and other unfair practices. These practices, in turn, were found to stem from excess production capacity and peculiarities inherent in coal mining. The problems of the industry appeared to be of a nature which defied solution by the industry itself, although they threatened its complete dissolution. The bituminous coal industry is national in scope. It is indispensable to the country's industrial civilization. It operates in 29 States, provides 75 percent of the fuel for manufacturing, about 80 percent of the fuel for railway locomotives, and about 70 percent

of the fuel for steam-generated electricity. In accordance with its traditional policy, Congress decided to stabilize the industry by legislation in the interest of the public.

METHOD OF STABILIZATION

The problems faced by the bituminous coal industry in the United States after the First World War were almost identical with those faced by the industry in virtually every other major coal producing country. Various countries tried various devices, including nationalization of coal deposits to remedy the economy of their coal industries. In the United States, however, the Congress chose to deal with these problems by balancing cost against realization through institution of minimum prices with the aid of the industry rather than resort to Government-controlled cartels or industry-freezing production or marketing quotas.

To insure producers the largest possible field for initiative compatible with stabilization, the Congress wrote into the Bituminous Coal Act the specific provision that "existing fair competitive opportunities" must be preserved by giving consideration, in fixing minimum prices, to the relative market value of coals, values as to uses, seasonal demand, transportation methods and charges, and competitive relationships between coal and other forms of fuel and energy, and the interests of consumers of coal.

Administration of the act was entrusted originally to the National Bituminous Coal Commission composed of seven members, some of whom represented the industry. Although it was able to perform important work in organizing the task before it, the Commission did not succeed in putting into effect the statutory mechanisms intended to rehabilitate the bituminous coal industry.

ORIGIN OF THE BITUMINOUS COAL DIVISION

Under Reorganization Plan No. II, issued by the President pursuant to the Reorganization Act of 1939, the Commission was abolished and its functions were transferred to the Secretary of the Interior as of July 1, 1939. By an order dated July 1, 1939, the Secretary constituted the Bituminous Coal Division in the Department of the Interior and empowered its Director to exercise, with minor exceptions, the functions of the Commission.

At the outset of its administration of the act, the Division effected extensive changes in organization and procedure; the field offices were consolidated and other economies were made. Pursuant to the pro-

visions of the Ramspeck Act, practically all employees were placed under civil service. Minimum prices and marketing rules and regulations were initially established on October 1, 1940. No court actions were prosecuted and consequently no stays or injunctions were issued by any court against the enforcement of those minimum prices and fair marketing rules. Minimum prices were generally revised October 1, 1942, in order to reflect changes in the costs of production.

BENEFITS TO INDUSTRY MEASURED

Although the fact that the industry enjoyed sufficient economic vigor to be able to meet wartime coal requirements may be regarded as substantial proof that its condition had improved under the operation of the act, the benefits which the act brought the industry are confirmed by more specific evidence.

Prior to the establishment of minimum prices, the costs of producing coal exceeded realization and the whole industry lost money. Despite the growing impetus of wartime industrial activities, this condition remained during the first 9 months of 1940. During these last months in which the industry operated without the protection of minimum prices, the average loss per ton for the industry as a whole was roughly 5 cents. The condition was not showing any progressive improvement. However, coincidental with the establishment of effective minimum prices, all coal has sold on a level sufficient to return to the industry its cost of production as defined in the coal act, and the industry's habitual losses disappeared.

The contrast between conditions in the industry with respect to the relationship of costs and realization before and after establishment of minimum prices is shown in Charts 1 and 2. Chart 1 shows that in 1938 about 80 percent of the commercial tonnage sold at a deficit. The average deficit of all commercial tonnage that year was 15 cents a ton. This amounted to an operating loss for commercial operators of about \$40,000,000. At all periods since the establishment of minimum prices, not less than approximately two-thirds of the industry's commercial tonnage sold at a margin above costs. During most of the time after the establishment of minimum prices, about three-quarters of the industry was operating above costs. In the first 3 months of 1941 there was about 80 percent of the production with a margin above costs. This percentage dropped somewhat with the revision of wages in April 1941, but remained at about 65 percent during the summer months. During October 1941 the industry was making in excess of 15 cents per ton, and 76 percent of the commercial mines were able to make a margin above costs.

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ON^{1/} AND COST^{2/} FOR COMMERCIAL^{3/} IN THE UNITED STATES 1942.

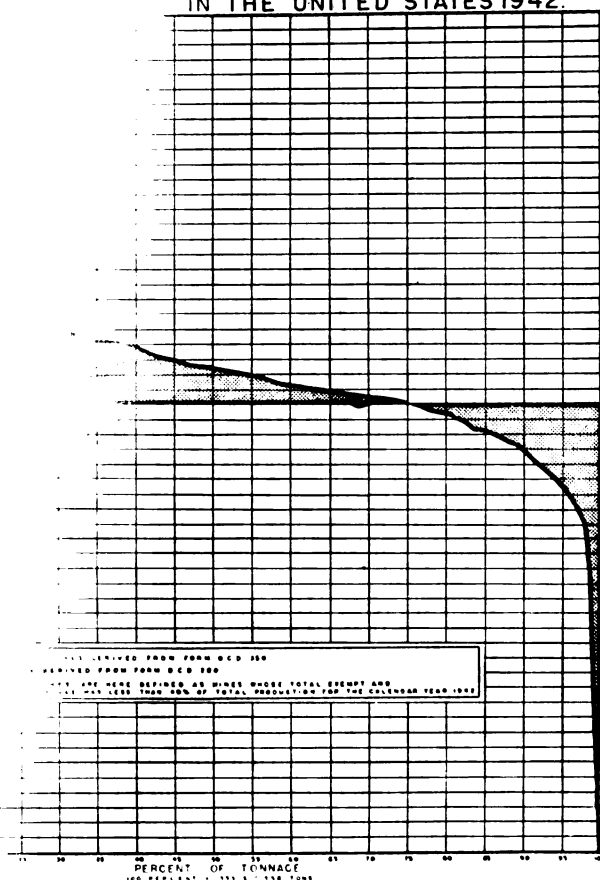


CHART 2

picture presented in Chart 2. It may reasonably be
a much larger segment of the industry would have
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quality and kind of coal, misleading and deceptive adver-
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COMPARISON OF REALIZATION AND COST¹ FOR COMMERCIAL² BITUMINOUS COAL MINES IN THE UNITED STATES, 1938.

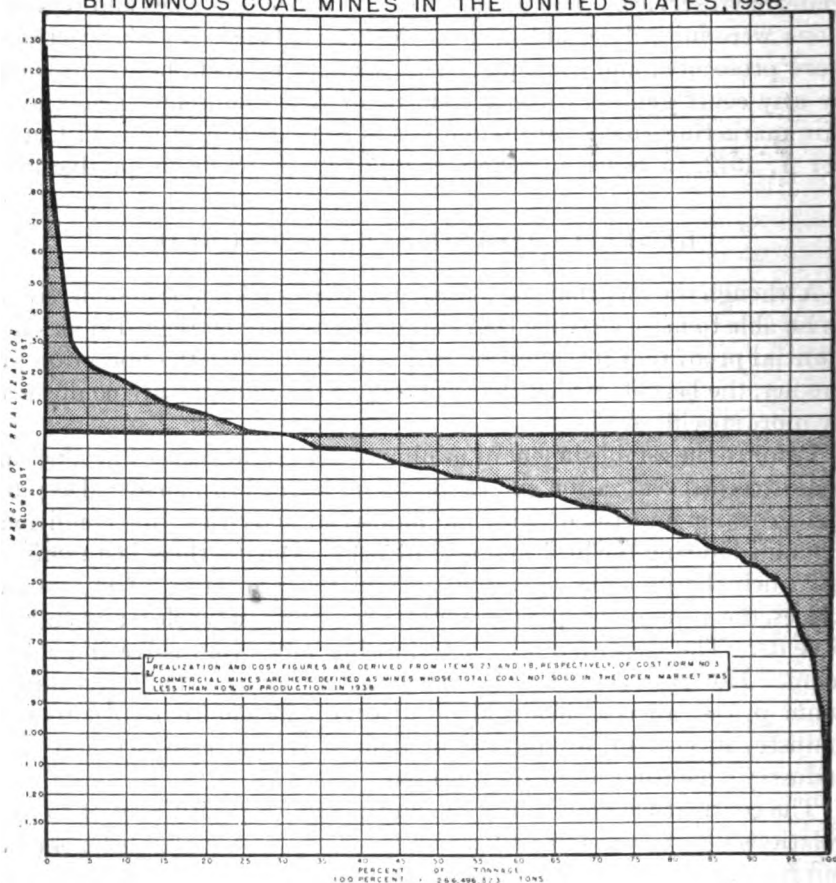


CHART 1

Chart No. 2 for 1942, shows that about three-fourths of the coal mines made a margin above costs. The margin for that year was about 12 cents a ton, a modest return, and for the commercial industry as a whole the operating margin was \$52,200,000, in sharp contrast with the deficit of \$40,000,000 in 1938.

While the establishment of minimum prices was not, perhaps, solely responsible for this changed relationship, clearly much of the improvement in the economic condition of the industry must be credited to the operation of the act. A considerable percentage of coal sold at the minimum price level throughout the year of 1942. In all likelihood this coal would have sold at still lower prices in the absence of the restraints of the statute. This would have wrought a considerable

COMPARISON OF REALIZATION^{1/} AND COST^{2/} FOR COMMERCIAL^{3/} BITUMINOUS COAL MINES IN THE UNITED STATES 1942.

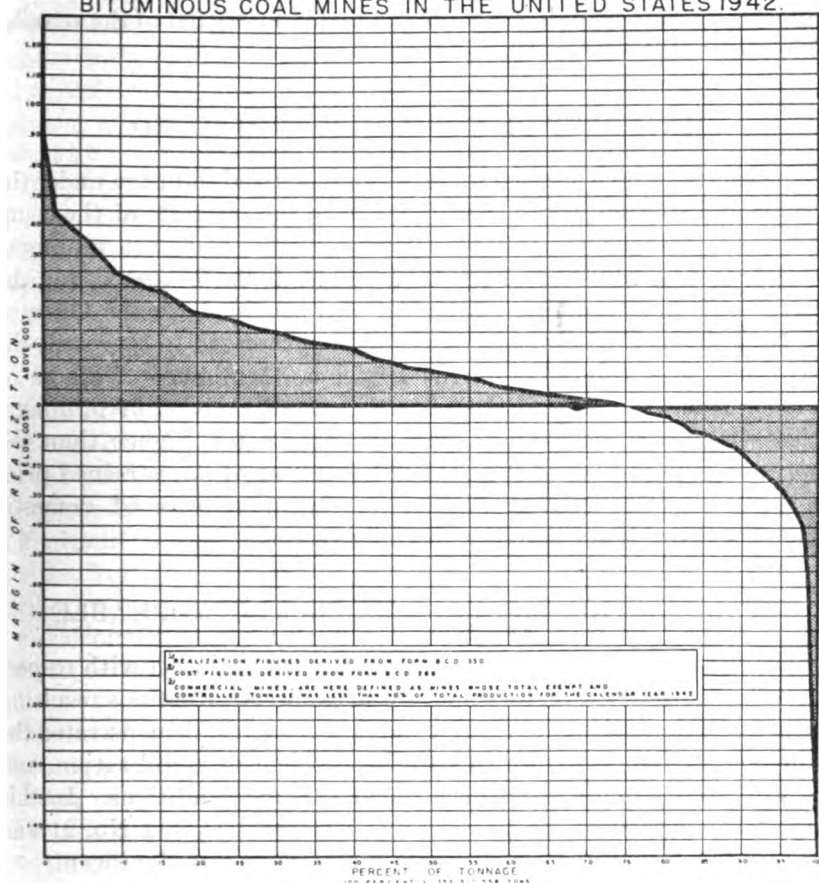


CHART 2

change in the picture presented in Chart 2. It may reasonably be concluded that a much larger segment of the industry would have lost money at a time when the Nation could ill afford to have the industry weakened.

The Bituminous Coal Act also established a structure for the marketing of coal. It provided for the elimination of discriminatory and other unfair trade practices which characterized the industry in the period prior to its enactment. Among these were secret rebates, discounts, attempts to purchase business, the intentional misrepresentation of the quality and kind of coal, misleading and deceptive advertising; the unauthorized use of trademarks, trade names, and slogans of a competitor, the breaching of contracts between a competitor and

his customer, employment of persons primarily for the purpose of procuring preferment with a customer. The act thus played an important part in bringing order to the coal industry out of the anarchy which prevailed a few years ago.

INTEREST OF CONSUMER PROTECTED

The benefits which accrued to the bituminous coal industry under the operation of the act were not prejudicial to the interests of the country's coal consumers. The act specifically directed that minimum prices, when established, must be designed to have regard for the interests of the consuming public. It also provided for the Office of the Bituminous Coal Consumers' Counsel, authorized to represent the coal consuming public before the Division. Minimum prices as of October 1942—the date of the general over-all revision of minimum prices—were, on the average, only 29 cents a ton higher than the depressed going prices of 1939, the last full year of unrestrained price competition. The average increase in the mine price of domestic sizes of coal was lower than the over-all average.

STABILIZATION MECHANISMS PROVED WORKABLE

During the last fiscal year, the administration of the act with respect to routine matters within its scope as well as special situations resulting from the Nation's change-over to a wartime economy, demonstrated the soundness of the act's approach to the problem of stabilization, and the workability of its mechanism under varying conditions. In this respect completion of the proceeding in General Docket No. 21 and the resultant general revision of minimum prices was significant.

Novel and complex economic and legal issues were involved both in the establishment and subsequent revision of a minimum price structure for an industry the marketing of whose products involved the most intricate price relationships. A sound and careful approach demanded that all interested persons be granted an opportunity to present in full their points of view. Lengthy hearings were the natural result. Time lags consequently preceded both the initial establishment and the general revisions of the minimum price structure. Yet it was clear that the objectives of the act could not be achieved unless it were feasible to translate speedily increases or decreases in costs of production into increases or decreases in minimum prices. Techniques were evolved in the course of the proceeding in General Docket No. 21 which assured the expedition of future proceedings looking toward general price revision.

The first phase of this proceeding was concerned with determining the changes in costs from those upon which the original price structure was based. Using 1940 as a base year, the Division made adjustments, over the protest of the Associated Industries of New York State, Inc., to reflect increases in labor costs due to the Appalachian wage agreement effective April 1, 1941. The determination was challenged in court by a petition for review filed by Associated Industries, which remained undecided upon the expiration of the act.

The second phase was concerned with the establishment of a minimum price structure for each minimum price area which would reflect the costs as determined in the first phase. One of the questions involved was whether minimum prices should be revised merely to reflect cost changes since the determination upon which the first price structure was based, or whether they should be revised to bring about approximate equivalence between costs established as current in the first phase of the proceeding. The formula adopted by the Director, over the protest of Associated Industries, and affirmed by the Secretary of the Interior was that in a general price revision proceeding, the minimum price should be increased or decreased so that minimum price realization, estimated upon as current and representative a distribution period as possible, would be at parity with current costs of operation, as nearly as could be ascertained.

Another basic issue was resolved in the second phase of the proceeding. It was discovered that the extent to which minimum prices for coals of each minimum price area had to be increased in order that an approximate equivalence between minimum price realization and costs of operation could be attained varied from minimum price area to minimum price area.

Revising in varying amounts the minimum prices for coal of different minimum price areas would have destroyed the coordination between competing districts, established in the initial price structure to effectuate the provision of the statute that the effective minimum price should preserve so far as possible the fair existing competitive opportunities in the industry.

To resolve this problem, the Director, again over the objection of Associated Industries, and the Bituminous Coal Consumer's Counsel, applied the so-called "weighted average adjustment method" in order to preserve the coordination. Under this method, price adjustments on coal moving into selected groups of consuming market areas were made uniform by the amount of the weighted average increase determined by weighting the realization increases needed by the combined tonnages of the coal sold in selected groups of consuming areas.

By applying these techniques in future general price revision proceedings it would have been possible to have made a general revision of minimum prices generally subject almost to mathematical determination.

ADJUSTMENT OF PRICES FLEXIBLE

As a means of keeping minimum price structures equitable, the Congress wrote into the act the means for quick adjustment of particular minimum prices or coordinations through petition under section 4 II (d). The operation of this provision of the act during the last fiscal year continued to demonstrate that varying interests involved in the production and marketing of bituminous coal can be equitably reconciled in the fixing and enforcement of minimum prices.

A majority of the 531 petitions filed under the section requested the establishment of prices for new coals coming on the market, rather than for revision of established prices. Of the petitions filed from July 1, 1942, through June 30, 1943, all but 68 had been acted upon and disposed of by the latter date.

RAIL-RIVER COORDINATION

One of the most complex tasks of the Division was to assign proper weights to the various factors enumerated in the price-fixing provisions of the act in establishing minimum prices for coals moving into markets served by both river and rail transportation.

The act provides that, in the establishment of minimum prices, "transportation methods and charges and their effect upon a reasonable opportunity to compete on a fair basis" shall be taken into account, and that prices "shall have due regard to the interests of the consuming public," and furthermore that "existing fair competitive opportunities shall be preserved as nearly as possible."

In many instances the cost of shipping coal by river is lower than the cost of shipping by rail, with the result that river-borne coals may have a competitive advantage in certain market areas although many other factors may play a part in determining the ability of producers who must ship by rail to compete against river shipping producers. Thus it becomes apparent that in defining the scope of the price provisions enumerated with respect to competing river and rail coals, the Division had to reconcile a complex of conflicting interests.

If the same price were established for river and rail coal moving into a previously rail-dominated market, river coal would deliver

cheaper and destroy previous competitive opportunities. Accordingly, in the original minimum price structure, in general, differentials in mine prices were established favoring rail coals which had been competing with river coals at a particular market area to the extent necessary to allow the rail coals to be sold at that market at the same delivered prices as river coals of equal value. No such differential was provided for rail coals which had not been competing with river coals. Mine prices for most river-borne coal were equated with mine prices for rail coal so that the minimum delivered price was for river-borne than for coal shipped all-rail.

It was not intended, however, to freeze the competitive situation in each market as it was recognized that any of many factors might encourage a particular consumer, or retailer, in the absence of minimum prices, to purchase river-borne coal rather than rail-borne coal. With this possibility in view, minimum price schedules for districts affected contained "special case machinery" whereby petitions for "free alongside prices" might be addressed to the Division under section 4 II (d). Twenty-one petitions for relief under this machinery were filed and permanent relief was granted in 13 and temporary relief in 3 cases. Disposition of 2 of the 5 remaining cases hinged upon the final disposition of the proceeding in Docket No. A-1239. This case was instituted by the Division to ascertain the merits of complaints by some independent retailers that the coordination of rail and river coals in the Cincinnati, Ohio, marketing area had placed them at a competitive disadvantage. Cincinnati had been found to be a rail-dominated market when the first price structure was established in General Docket No. 15. The record indicated that it was essential to maintain the Cincinnati rail market because lack of continuity of traffic on the Ohio River due to freezing or floods jeopardized a continuous coal supply. At such times when transportation was disrupted serious coal shortages might occur in the Cincinnati area if the rail market were eliminated through preferential treatment of river-borne coal. It was found that the marketing situation in Cincinnati was further complicated by a conflict of interests between independent retailers and the so-called integrated retailers who were part of large organizations engaged in the production and transportation as well as the retailing of coal. After considering all factors involved, the Division had coordinated the mine prices for all-rail coals and river coals moving into the Cincinnati area so as to equate the delivered price of such coals.

However, data obtained in the proceeding in Docket No. A-1239 indicated that a substantial differential existed between the costs of the independent and integrated retail operations in the Cincinnati

area. The record also indicated that a substantial increase had taken place in the volume of coal moving by river into this area.

The report of the Examiner in Docket No. A-1239 issued after the end of the fiscal year, illustrates that the minimum price structure is susceptible of sensitive and equitable adjustment at controversial points.

The examiner recommended, first, that all retail dealers in Cincinnati, whether independent or affiliated with producers, should be permitted to purchase at mine prices for free alongside delivery provided they undertake to resell at prices not below the minimum f. o. b. mine price for all-rail shipment, plus the all-rail freight rate from the origin point to the point of resale. The examiner recommended, second, that machinery be established whereby a rail shipper threatened with loss of any business with a retail dealer, might be permitted to reduce his prices on particular sizes to the extent necessary to afford him an opportunity to compete for business previously enjoyed. Finally the examiner recommended that producers shipping coal by river to the Cincinnati area in facilities owned or controlled by them, and selling it through affiliates at retail, be required to increase on their books their f. o. b. mine realization by the amount representing the difference between the all-rail freight rate between the points of transit and the actual cost to them of transportation reasonably computed. Because of the expiration of the act, time was not available for final disposition of the proceeding.

MARKETING AGENCIES

Section 12 of the act exempted from the prohibitions of the anti-trust laws of the United States marketing agencies disposing of bituminous coal in commerce upon condition that such agencies obtain Division approval and conform with "reasonable regulations for the protection of the public interests" to be prescribed by the Division. The grounds for Division approval were enumerated in the statute. The Division deemed it a crucial responsibility to see that general national policies exemplified in the antitrust laws were not violated by the marketing agencies and that, on the contrary, such agencies were made to subserve the national interest by employing more economical methods of marketing coal.

At the outset of the administration of the act a number of marketing agencies were provisionally approved by the National Bituminous Coal Commission. By 1941 these agencies had become fully organized and were beginning to exercise an appreciable influence on the market. The Division issued orders to the agencies to show cause why

additional restrictions should not be imposed on them in the public interest. During the last fiscal year examiners' reports were submitted in 11 proceedings. The examiners recommend that previous orders which had been issued provisionally approving the agencies involved be modified. Although the additional restrictions varied in detail from agency to agency, the examiners recommended generally that the commissions the agencies received on sales should not exceed 10 percent, that no increases should be effected in the agency list prices without Division approval, that the list prices might be suspended by the Division upon proof of their unreasonableness, and that the agencies should submit appropriate reports. Expiration of the act prevented final disposition of these proceedings.

COMPLIANCE

The magnitude of the task of enforcing compliance may be judged by the fact that the act and implementing regulations issued by the Division applied to some 17,000 companies or individuals as producers, sales agents, or distributors engaged in diverse practices in connection with the production and marketing of coals of a wide variety of kinds, qualities, and sizes. A great preponderance of those engaged in the industry were appreciative of the benefits of these regulations and cooperated in their enforcement. However, the urge to obtain more business prompted a relatively few to resort to practices prohibited by the act. This was true even in times of unprecedented demand such as experienced during the past fiscal year.

Instances of price violations were generally found in connection with the sales of lower grades of coal. Some producers disregarded the over-all benefits of the act to resort to unfair practices to obtain markets for residual sizes. A greater proportion of all violations were simple, most frequently being sales of coal at prices less than the effective minima. However, several cases came to light where elaborate and intricate schemes had been devised for evading price and other regulations. Systematic checking by the compliance staff of the Division disclosed many inadvertent as well as wilful violations. When compliance checks indicated wilful violation, compliance proceedings were instituted either by the Bituminous Coal Producers' Boards or by the Division.

During the fiscal year, 508 such investigations were completed, 88 hearings were held, and 129 orders imposing the penalties under the act, and Rules and Regulations were issued. Of these, 69 directed producers to cease and desist from further violations; 42 revoked the code membership of producers, the restoration of which were condi-

tioned upon payment of taxes ranging from moderate sums up to \$8,500.08, and totaling \$49,803.65; 15 suspended or revoked the registration of distributors, and 3 directed distributors to cease and desist from further violations.

One compliance proceeding during the fiscal year was the second of its kind in the history of the act. In the *Matter of Albuquerque and Cerrillos Coal Co.*, Docket No. 1808-FD, the Director was called upon to make a ruling under the provisions of section 9, which insures that labor practices in the coal industry will be consistent with the national policy relative to collective bargaining established by other statutes. It was found that the Albuquerque and Cerrillos Coal Co., a New Mexico producer, had failed to accord its employees the right to bargain collectively and that it had been guilty of restraining, coercing, and interfering with the free exercise of their collective bargaining rights. The Director thereupon certified his findings to departments or agencies of the United States to which the producer was supplying coal, in accordance with the provisions of section 9, which further provided that such agencies or departments should cancel their contracts for coal with the producer.

LITIGATION

The nature and extent of litigation with respect to the rulings and other administrative actions of the Division during the fiscal year testified to a high degree of acceptance on the part of those concerned. Although a considerable number of punitive orders were issued by the Director because of violations of the act, and a considerable number of orders were issued resolving complicated and delicate issues, only one petition for review of administrative action was filed during the fiscal year in a circuit court of appeals under section 6 (b) of the act. It and all the challenged determinations of the Division which had been reached before the beginning of the past fiscal year were upheld by the courts.

The city of Indianapolis had filed on May 21, 1942, in the Circuit Court of Appeals for the Seventh Circuit, a petition for review of the Director's order, dated April 7, 1942, dismissing its application under section 4 II (1) of the act for exemption of coal produced by a wholly owned subsidiary corporation of West Virginia. The single question raised was whether the Director had correctly found that the petitioner was not the producer of the coal involved. The court, basing its decision upon one by the United States Supreme Court, repudiated one of its former decisions which had reached a contrary result, and upheld the action of the Director, *City of Indianapolis v. Wheeler and*

Ickes, 132 F. (2d) 897 (C. C. A. 7th, 1943). Petition for writ of certiorari was denied by the Supreme Court April 5, 1943.

The Ozark Coal Co. had filed on May 23, 1942, in the Circuit Court of Appeals for the Sixth Circuit, a petition for review of the Director's order, dated March 28, 1942, establishing minimum prices for certain coals produced at the Sunshine Mine in District 14 (Arkansas). The principal questions raised were whether the Director's findings concerning the physical characteristics and market value of the coals involved were supported by substantial evidence, whether the prices were properly established pursuant to the price-fixing provisions of the act, and whether the administrative findings were proper in form. By order, dated May 31, 1943, the court affirmed the action of the Director without opinion. *Ozark Coal Co. v. Wheeler and Ickes*, No. 9275. The time for filing a petition to the Supreme Court for writ of certiorari has not yet expired.

The Binkley Mining Co. of Missouri, filed on July 16, 1942, in the Circuit Court of Appeals for the Eighth Circuit petitions to review two orders of the Director, dated June 4, 1942, directing the petitioner to cease and desist from violations of the Bituminous Coal Code. These cases, involving similar facts, raised the question whether the Division possessed statutory authority to continue a compliance proceeding instituted upon complaint by a district board when the district board subsequently sought to terminate the proceeding. Also involved was the question whether the Director's findings that the petitioner had wilfully violated the code in selling coal at less than the applicable minimum prices which had been established by the Division, were supported by substantial evidence. The court affirmed the Director's action in both cases. *Binkley Mining Co. of Missouri v. Wheeler and Ickes*, 133 F. (2d) 863 (C. C. A. 8th, 1943); *Binkley Mining Co. of Missouri v. Wheeler and Ickes*, 133 F. (2d) 872 (C. C. A. 8th, 1943). The Supreme Court denied petitions for certiorari filed in both cases, June 7, 1943.

OUTLOOK FOR THE BITUMINOUS COAL INDUSTRY

Several bills were introduced during the first session of the Seventy-Eighth Congress to extend the Bituminous Coal Act which was due to expire April 26, 1943. Although the act twice was extended—for a total of 4 months—by congressional resolutions, the Ways and Means Committee of the House of Representatives failed, after a complete hearing, to report any bill providing for extension of the act beyond August 23, 1943. On June 30, during the hearing on H. R. 1454, and other bills to extend the act, H. J. Resolution 145

was introduced. It provided for extension of the act until January 1, 1944. This resolution was reported by the Ways and Means Committee July 1, and the Rules Committee was asked for a rule permitting its consideration by the House. Pending consideration of the Resolution by the Rules Committee, the Ways and Means Committee voted not to report H. R. 1454, and no further action was taken on H. J. Resolution 145.

Testimony offered at the hearing on bills to extend the Bituminous Coal Act was to the effect that it had provided workable mechanisms for stabilizing the industry without injury to the consumer. It was testified that continued stabilization is needed so that the industry can continue to supply an adequate amount of fuel both in time of peace and in time of war.

In any event, the fundamental economic characteristics of the coal industry which led the Congress to consider regulation desirable in the first instance have in no way been modified and will continue during and after the present war. The various factors responsible for these continuing conditions are:

(1) The number of production units in the coal industry ranges between 12,000 and 17,000 scattered over 29 States, selling coal in competition in numerous markets without let or hinderance, yet the four largest commercial companies produce only a little more than 10 percent of the country's commercial tonnage. The situation is then one in which there are a large number of weak sellers confronted with a relatively small number of strong buyers who can demoralize the market by playing one necessitous seller against another, because the operators, being so numerous and having such a diversity of interests, are not able by themselves to bring about a stability between costs and prices in contrast with other industries in which the units are not so numerous or heterogeneous.

(2) There are wide variations in costs and prices, which enables those favored by these conditions to demoralize the market in the competitive pursuit of tonnage.

(3) A further cost characteristic of the coal industry has a marked effect on prices. That is, coal of various sizes is produced at joint costs. In order to produce lump, it is necessary also to produce other sizes. It is not possible to determine accurately what amount of the cost should be borne by each product other than to let the relative demand for the products make such a determination. If one particular size is in demand, the company will concentrate on that size and then sell the other resultant sizes for whatever the market will yield. It is hoped by the company that the total revenue will equal or exceed the total costs. But the entrance onto the market of coal

which must be produced in order for the company to fill its contracts has a demoralizing effect on the market, and may be detrimental to all other companies competing in that market. Much coal is thus sold on the market at prices which are in no way related to costs, and the result under free competition frequently was that total revenue was less than total costs for the industry as a whole.

(4) Certain factors make for an existence at various periods of an overcapacity in the coal industry. Coal production ordinarily is a highly seasonal industry. The industry is built up to produce enough coal at least to supply the market during the peak seasons. During the other seasons there is a great overcapacity in many districts. There is an urge to sell coal to keep the plant going to lessen the burden of overhead costs. During periods of slack production, of either a seasonal or cyclical character, there is a downward pressure on prices.

(5) The fact that the demand for coal is inelastic has much to do with the instability of the industry. That is, a reduction in prices does not encourage coal consumers to consume any appreciably greater amount of coal at any one time. The existence of large stocks has an unusually depressing effect on coal prices, and prices fluctuate violently up and down as the stocks of coal are small or large. The stage is set for price-cutting in a situation in which the total requirement is fixed and in which various producers attempt to save themselves from a small volume of output in dealing with buyers who are indifferent to price as an incentive to use more coal. On the contrary, when there is a reversal of all of these factors, the price of coal soars to levels in no way related to costs.

(6) Certain practices in the sale of coal, sometimes associated with the fact that coal of various sizes is a joint product with coal of other sizes, tend to aggravate the effect of the extreme willingness of sellers to sell at any price obtainable. A car of coal may be listed with several distributors who contact many prospective customers, and each distributor if given the opportunity, may be willing to sell this distressed coal at any price in order to realize a commission. This demoralizes the market out of all proportion to the amount of coal which is being offered at distressed prices.

The result of these economic factors that make for ruinous competition was disastrous. The market price at the mine was set by the delivered price less the freight, and those mines with higher freight rates at greater distance from the market in some cases practically were giving their coal away. The low prices exert a pressure on costs which are largely in the form of wages. Since about 60 percent of the cost of mining is in wages, and since all other elements in the delivered price of coal are more or less rigidly fixed, except certain

overheads which can be ignored a while, there was great pressure directly or indirectly on wages as prices declined. This opened the way for conflict between owners and miners.

But the mine owners were not able to pass on in wage economies all of the burden of the instability of the industry, even though wage rates under free competition in the pre-regulation period sunk to ever lower levels. The ultimate consequence in too many cases was the bankruptcy of mining companies. Contrary to some theoretical doctrines, bankruptcy of mining companies was slow in bringing any relief to the coal industry. Once bankrupt, the capital structure was reorganized, capital charges written off, new money raised in one way or another for working capital, and the new concern proceeded in its desperate course trying in its turn to avoid bankruptcy through a still more desperate process of cutting prices, cutting wages, and wasting the coal resources of the Nation. Thus the process went on without any relief and brought chaos to the industry and the development of unfair trade practices which were patently detrimental not only to the industry itself but detrimental to the orderly course of business and detrimental to consumers. The whole process took no account of the morrow and was violently prejudicial to the interest of the consumers of the near future.

The existence of the present period in which there is a favorable relationship between realization and costs is not unique. Such periods have existed before. In every such instance, however, weakened markets have followed such periods accompanied by a return of chaotic conditions to the coal industry.

In the absence of any statutory control designed to continue stabilization and with markets weakened when the war-expanded demand ceases, it is reasonable to assume that the destructive forces which were eliminated by the Bituminous Coal Act will again become characteristic of the bituminous coal industry.

Petroleum Conservation Division

J. W. STEELE, Acting Director

THE program of the Federal Government to conserve the Nation's deposits of crude oil was inaugurated a little more than a decade ago with the enactment of the NIRA, later held unconstitutional by the Supreme Court. The Connally Act, approved February 22, 1935, was enacted shortly after the demise of the NIRA and contains the same prohibitions with respect to the transportation in interstate commerce of petroleum that were contained in the latter act. With the Nation now in its second year of active participation in World War II, facing what may become a serious shortage of petroleum, the foresight of Congress in enacting this legislation is becoming increasingly apparent.

The Petroleum Conservation Division, established in the Department pursuant to Executive order, has for more than 8 years been devoted to the promotion of conservation of petroleum and to the administration and enforcement of the Connally Act. The act prohibits the transportation in interstate commerce of petroleum and its products produced in excess of amounts permitted under State laws and authorizes the President, or any officer he may designate, to prescribe regulations for enforcement of its provisions. Under this authority, regulations have been promulgated requiring the keeping of books and records by those engaged in producing, transporting, and refining petroleum and providing for the filing by those operators of comprehensive sworn reports of their operations. The report system is designed not only to keep the Division informed as to operations in the industry but also to deter the production of oil in excess of allowables by rendering difficult its undetected disposition. The Supreme Court has held that the falsification of a report required under these regulations is a felony punishable under Section 80, Title 18, United States Code.

OPERATIONS OF FEDERAL PETROLEUM BOARD

Federal Petroleum Board, with headquarters at Kilgore, Tex., in the East Texas Oil Field, and subordinate branch offices at Midland, Houston, and Corpus Christi, Texas and New Orleans, Louisiana received during the fiscal year monthly reports of petroleum production, transportation, and refining operations from the principal oil producing and refining areas of the southwest. The regulations under the act are effective in 106 counties of Texas, in the two principal oil producing counties of New Mexico, and in the entire State of Louisiana, an area containing 726 oil fields producing daily an average of 1,571,000 barrels of crude oil, 77 refineries producing daily an average of 1,200,750 barrels of petroleum products, and 126 gasoline plants producing daily an average of 91,000 barrels of gasoline and liquefied petroleum gases.

The regulations require also that operators of tankers, barges and other vessels shall report to the Washington, D. C., office of the Petroleum Conservation Division, on a prescribed form, all cargoes of petroleum or its products loaded for interstate shipment at any port in Texas, Arkansas, Louisiana, or Mississippi and the discharge of such cargoes if unloaded at any port in the United States. Statistical information from these as well as reports filed with the Federal Petroleum Board is made available regularly to the Petroleum Administration for War.

Enforcement of the act and administration of the regulations in effect thereunder is principally a field operation. Physical inspection of properties and facilities of oil operators is considered necessary to effective enforcement and maintenance of proper control over the interstate movement of petroleum and petroleum products. The Board's activities in this regard have of necessity been curtailed within the past year because of inductions into the armed forces of experienced personnel and reduction in automobile travel to conserve rubber.

Despite reductions in personnel and travel the volume of criminal investigative work has been maintained at a comparatively high level. Eighteen major criminal investigations initiated in the fiscal year together with 6 investigations in progress at the close of the preceding year were disposed of as follows: One case was successfully prosecuted as to 8 of 10 defendants, leaving 2 defendants yet to be tried; 2 cases were closed by action of the Board; 2 cases were closed by United States attorneys; 1 case was closed by the Attorney General. At the close of the year 6 cases were pending with the Department of Justice, 2 were pending on dockets of United States district

courts on indictments returned during the year, 2 cases were complete and in process of transmittal to the Department of Justice and 4 cases were under investigation.

At the beginning of the year 10 criminal cases involving violations of the act were pending with the Department of Justice. Six of the cases were closed without action because of insufficiency or inconclusiveness of the evidence. One case was tried to a jury which returned verdicts of not guilty, and 3 cases in which indictments were returned during the year were pending trial on June 30, 1943.

Four criminal cases were pending in the courts at the beginning of the year. Two of them were successfully prosecuted, one was dismissed on motion of the United States Attorney and one was pending trial on June 30, 1943.

In the three cases successfully prosecuted fines aggregating \$21,500 were assessed and several suspended sentences were imposed.

Bonneville Power Administration

PAUL J. RAVEN, Administrator

I. THE WAR YEAR

COLUMBIA River hydroelectricity, sold directly by the Bonneville Power Administration during the fiscal year 1943, powered the production of enough aluminum to make 70,000 fighter airplanes.

By mid-year, 19 aluminum pot lines had been installed in 5 huge Northwest aluminum reduction plants. At each plant, as construction neared completion, Bonneville had a power supply ready and waiting.

The wisdom of a regional program, premised on the development of Northwest power resources well in advance of need, had, by 1943, proved the greatest single factor in making effective the Nation's light metals production for war.

The \$300,000,000 investment by the people of the United States in the 10-year Bonneville-Grand Coulee enterprise had proved, in the words of Frank J. Taylor, writing in the *Saturday Evening Post*, "as gilt-edged as any war bond, cheap at any price."

WEAPONS FOR WAR

In the fiscal year 1943, power from the Federal system flowed directly into Northwest war plants with a capacity sufficient to produce in one year:

Enough calcium carbide, valued at \$2,400,000, to make approximately 30,000,000 cubic feet of acetylene, sufficient to build 200 Liberty ships.

Enough ferrosilicon, valued at \$1,200,000, to deoxidize 2,500,000 tons of steel, sufficient for 150,000 medium tanks.

Enough additional ferrosilicon, valued at \$1,000,000, to produce 48,000,000 pounds of magnesium metal, worth \$10,000,000, sufficient for 10,000,000 incendiary bombs.

Enough ferrochrome, valued at \$5,000,000, to produce 300,000 tons of armor plate, sufficient to protect 30,000 heavy tanks.

Motive power and electric heat for the production of 208 ships.

Not the least of these contributions to victory was the fact that these basic materials were being produced at the year's end through a minimum use of manpower. The Columbia River offset the drain on man-hours with kilowatt-hours.

POWER POOLED FOR WAR

In addition to direct power service to its own war customers, the Bonneville Administration supplied 11 other utilities systems with net deliveries of 959,617,265 kilowatt-hours during the last 11 months of the fiscal year 1943 under terms of a region-wide power pool agreement.

The autumn months of 1942 saw the lowest stream flow conditions in 54 years of recorded run-off history on all rivers but the Columbia, which has its source in the perpetual ice fields of the Canadian Rockies.

During this period, by consistently overloading the generators at Bonneville and Grand Coulee, the Bonneville Administration was at times able to assume, through pool connections, nearly 50 percent of the entire power load in the States of Oregon and Washington.

But the Bonneville Power Administration's contribution was not confined to the production of weapons and the conservation of manpower. During the fiscal year ending June 30, 1943, the Administration's revenues from the sale of power totaled \$11,265,468.¹

SIX YEARS GROWTH

This record of wartime achievement was established during the Bonneville Administration's sixth year of existence.

In August of 1937 the Administration was created by act of Congress as a provisional agency, set up for the transmission and sale of hydroelectric power generated at Bonneville Dam.

In the annual report for that first fiscal year (ending June 30, 1938), the Bonneville Administrator said:

Modern warfare is fought in the factory as much as in the air or trenches. America must be ready to meet not only peacetime needs of power for home, farm and industry, but must be assured of her ability to cope with emergency demands for large blocks of electricity. In the hydroelectric streams of the Pacific Northwest is potential power far in excess of that available in other regions of the Nation. It should be developed at an economic rate to meet mounting peacetime needs and the equally important possibilities of emergency drains.

Preparedness requires foresight.

¹ Detailed financial reports have been omitted for duration of the war.

The second fiscal year (ending June 30, 1939) saw the launching of a basic construction program which involved the design and initial construction of the agency's huge network of high-voltage transmission lines.

In the third fiscal year (ending June 30, 1940), the agency's power sales program was begun and by the close of that year 188,415,933 kilowatt-hours of electricity had been sold.

In the fourth fiscal year (ending June 30, 1941), Bonneville, by virtue of its substantial volume of power sales, assumed major status as an operating utilities enterprise. It was during this year that Bonneville became a dominant force in the Northwest's preparedness program. As the year closed, 265,000 kilowatts of demand were under contract to six first-line defense industries.

In the fifth fiscal year (ending June 30, 1942), power contracts had risen to approximately 500,000 kilowatts.

II. POWER SALES FISCAL YEAR 1943

* Thirty-five power contracts involving new power sales were executed by the Administration during the fiscal year.

Of these, 20 contracts were with new customers and embraced an over-all contract demand of 203,450 kilowatts. The remaining 15 represented revisions or amendments or supplemental agreements with existing customers for additional power.

Contract demand for all 35 contracts totaled 398,145 kilowatts. Of this total, 363,200 kilowatts represented industrial sales; 15,160 kilowatts, sales to military establishments; 1,100 kilowatts, sales to cooperatives; 18,285 kilowatts, sales to public or peoples' utilities districts; 200 kilowatts, sales to municipalities; and 200 kilowatts, sales to privately owned utilities companies.

By June 30, 1943, the Administration had in effect 85 executed power and interchange contracts, with a total over-all contract demand of 910,752 kilowatts.

On a contract demand basis, these sales were divided as follows:

Industrial sales 806,200 kilowatts; military establishments 21,200 kilowatts; cooperatives 8,060 kilowatts; public or peoples' utilities districts 45,900 kilowatts; municipalities 5,725 kilowatts; and privately owned utilities companies 23,667 kilowatts.

The 1943 revenues of \$11,265,468 more than doubled the 1942 total of \$5,162,376, and brought the total revenues collected by this Administration since its inception to \$18,719,753.

THE WAR MARKET

The Administration's war power market involved principally two types of customer: industrial purchasers and military establishments.

Principal sales in this category, during the year, were the six contracts executed with Defense Plant Corporation establishments, involving 332,000 kilowatts of contract demand. Most of this power was for aluminum reduction and fabrication. Another 32,000 kilowatts of contract demand was divided among six other customers. Of these, the principal purchaser was a third large shipyard in the lower Columbia River district, with a demand for 12,000 kilowatts. Of the 11 military establishments to execute power contracts during the fiscal year, four were Navy Department installations and seven were army installations. Although these military establishments were widely scattered throughout the entire Northwest area, the wide range of the Administration's already constructed transmission facilities made it possible to render prompt service with relatively small difficulty.

New industrial and military sales fiscal year 1943¹

	Contract demand in kilowatts	Date executed
DPC-Spokane Aluminum Reduction Plant	130,000	Feb. 9, 1943
DPC-Spokane Aluminum Rolling Mill	50,000	Nov. 25, 1942
DPC-Spokane Ferrosilicon Magnesium Plant	56,000	Dec. 21, 1942
DPC-Tacoma Aluminum Reduction Plant	42,000	Aug. 20, 1942
DPC-Troutdale Aluminum Reduction Plant	32,500	Dec. 23, 1942
DPC-Wenatchee Ferrosilicon Plant	22,000	Dec. 21, 1942
E. I. du Pont de Nemours & Co.	² 800	Mar. 31, 1943
Electro Metallurgical Co.	³ 2,000	Mar. 1, 1943
Kaiser Company, Inc.	³ 300	July 1, 1942
Kaiser Company, Inc. (Swan Island)	12,000	Nov. 24, 1942
Olympic Mines, Inc.	2,000	May 24, 1943
Pacific Carbide & Alloys Co. (Portland)	400	Aug. 1, 1942
Pacific Carbide & Alloys Co. (Tacoma)	6,000	Feb. 25, 1943
Reynolds Metals Co.	⁴ 4,000	Nov. 18, 1942
Do	⁵ 1,200	Jan. 23, 1942
Do	⁵ 2,000	
11 military establishments	15,100	
Total	378,300	

¹ Includes direct sales only. Excludes sales and deliveries to public and private utilities for war purposes.

² Temporary construction power.

³ Short-term overload power.

⁴ Covered 4,000 kilowatts.

⁵ This amendment to be executed as of June 1, 1943, increased to 6,000 kilowatts the contract demand under preceding footnote.

THE PUBLIC POWER MARKET

Seven new contracts negotiated with public-owned power agencies and cooperatives during the fiscal year comprised a total demand value of 19,585 kilowatts.

Of these, one contract was signed by a municipality, three were signed by utilities districts, and three by cooperatives. They brought

the total of "public agency" contracts in force to 52 by the end of the year exclusive of those contracts executed with federally owned agencies.

The cumulative list follows:

Contracts with public agencies as of June 30, 1943

Name of purchaser (D)	Contract demand	Date	Name of purchaser (D)	Contract demand	Date
I. PUBLIC OR PEOPLES' UTILITY DISTRICTS			II. MUNICIPALITIES.—CON.		
Central Lincoln ¹	Kilowatts (²)	Feb. 25, 1942	City of—Continued		
Clark County, Wash.			Tacoma, Department		
No. 1.....	10,750	Aug. 1, 1942	Public Utilities,	(¹¹)	Mar. 5, 1940
Clatskanie ³	800	Mar. 4, 1942	Division, Tacoma,		
Columbia River ⁴	(²)	Dec. 18, 1942	Wash.....	5,725	
Cowlitz County, Wash.			Total.....		
No. 1.....	3,000	Apr. 28, 1941			
Grant County, Wash.			III. COOPERATIVES		
No. 2 ⁵	370	June 12, 1942	Benton-Lincoln Electric		
Grays Harbor Co., Wash.			Inc.....	400	Oct. 9, 1942
No. 1.....	2,300	Sept. 21, 1942	Benton Rural Electric		
Kittitas County, Wash.			Assn., Inc. ¹²	325	June 4, 1942
No. 1.....	100	Aug. 21, 1942	Big Bend Electric, Inc. ⁴	260	June 11, 1942
Klickitat County, Wash.			Blachly - Lane County		
No. 1 ⁶	575	June 3, 1942	Electric Assn. ¹³	50	Oct. 7, 1941
Lewis County, Wash.			Clearwater Valley Light		
No. 1.....	400	May 1, 1942	& Power Assn., Inc. ³	700	June 17, 1942
Nehalem Basin ⁴	(²)	July 9, 1942	Columbia County Rural		
Northern Wasco County ⁴	4,000	Oct. 28, 1940	Electric Assn.....	300	Dec. 1, 1942
Pacific County, Wash.			Douglas Electric, Inc. ¹⁰	625	July 1, 1942
No. 2.....	980	Sept. 8, 1941	Idaho County Light &		
Skamania County,			Power Assn., Inc. ³	160	June 8, 1942
Wash. No. 1 ⁴	925	Apr. 9, 1942	Inland Empire Rural		
Tillamook ⁴	2,000	May 15, 1940	Electrification, Inc. ³	1,400	May 28, 1942
Union County ⁴	(²)	Mar. 2, 1942	Kootenai County Rural		
Wahkiakum County,			Electric Assn. ⁴	210	June 9, 1942
Wash. No. 1.....	700	Feb. 17, 1943	Lincoln Electric, Inc.	700	May 20, 1942
Whatcom County, Wash.			Nehalem Valley Electric		
No. 1 ⁴	16,500	May 15, 1942	Assn.....	150	Dec. 24, 1942
Yakima County, Wash.			Nespelem Valley Elec-		
No. 1 ⁴	2,500	July 9, 1941	tric, Inc.....	100	Feb. 19, 1941
Total.....	45,900		Northern Idaho Rural		
II. MUNICIPALITIES			Electrical Rehabilitation		
City of—			Assn., Inc. ⁴	400	Apr. 29, 1943
Canby, Oreg. ⁸	300	Dec. 22, 1939	Okanogan County Elec-		
Cascade Locks, Oreg.....	200	Feb. 14, 1939	tric, Inc. ⁴	120	June 8, 1942
Centralia, Wash.....	300	Feb. 13, 1940	Pend Oreille Electric,		
Drain, Oreg. ¹⁰	250	Mar. 14, 1941	Inc. ⁴	200	May 1, 1943
Ellensburg, Wash.....	2,000	Apr. 1, 1942	Salem Electric Assn.....	100	Mar. 17, 1941
Eugene, Oreg.....	(¹¹)	Aug. 20, 1940	Stevens County Electric,		
Forest Grove, Oreg. ⁹	750	Nov. 7, 1939	Inc. ⁴	310	June 2, 1942
Grand Coulee, Wash.....	525	Mar. 6, 1943	Umatilla Electric Assn. ¹²	1,350	June 10, 1942
McMinnville, Oreg.....	1,000	Jan. 13, 1940	Wasco Electric, Inc.....	200	Dec. 1, 1942
Monmouth, Oreg.....	400	May 1, 1942			
Seattle, Wash.....	(¹¹)	May 6, 1940	Total.....	8,090	
			Grand total.....	59,685	

¹ This public utility district is currently operating but is not at present served by BPA.

² No contract demand specified.

³ This public utility district is currently operating but presently has only an emergency service connection with BPA.

⁴ This public utility district is not yet in operation.

⁵ Served via WWP Co.

⁶ Served (at Condit point of delivery) via PP&L Co.

⁷ Total of 3 points of delivery, only 1 of which is energized or constructed, viz.: Condit, 100 kilowatts; North Dalles, 125 kilowatts; Goldendale, 350 kilowatts.

⁸ Served via PP&L Co. at White Salmon River point of delivery, but directly by BPA at North Bonneville and Bonneville Dam delivery points.

⁹ Served via PGE Co.

¹⁰ Served via COP Co.

¹¹ Interchange.

¹² Served via PP&L Co.

¹³ Not energized; completion of line to connect with Eugene substation deferred for duration.

PROGRESS OF PUBLICLY-OWNED AGENCIES

The progress of the Northwest's publicly owned and operated power distribution agencies which purchased all or part of their requirements from the Bonneville Administration was reflected during fiscal 1943 in the increased volume of these purchases. During the year Bonneville power sales to such agencies practically doubled, rising from a total of 89,454,000 kilowatt-hours in fiscal 1942 to 176,723,000 kilowatt-hours.

Of this total, Bonneville's sales to municipalities rose from 22,212,000 in 1942 to 25,737,000 in 1943, while the revenue received increased from \$98,463 to \$99,952. Sales to public utility districts rose from 62,918,000 kilowatt-hours in 1942 to 123,519,000 kilowatt-hours in 1943, while the revenue received rose from \$159,194 to \$364,546. Sales to cooperatives rose from 4,324,000 kilowatt-hours in 1942 to 27,467,000, an increase of 500 percent, in 1943, and the revenues received rose from \$20,526 to \$123,142.

Public power distribution agencies showed steady gains throughout the year in operating revenue, and many showed continued reductions in retail power rates to consumers. A number accumulated substantial surplus funds and, pending further reductions in rates, applied these moneys to the purchase of war bonds.

Several public agencies went into operation during the year. Of these, particularly notable were the Central Lincoln Public Utility District and the Clatskanie Public Utility District, both in the State of Oregon. The latter agency succeeded in selling its revenue bonds at the remarkably low interest rate of 2.8 percent.

Following are typical case histories of public power distribution agencies in the Pacific Northwest.

Cowlitz County Public Utility District No. 1, one of the larger districts in the State of Washington, acquired its properties in November 1940 at \$6,800,000. For the year ending December 31, 1942, it showed a net surplus of \$112,575.06 and an accumulated surplus of \$405,669.99 for amortization after paying all costs of operation, interest, depreciation, and taxes.

During the year ending June 30, 1943, the district reduced the rates or "revenue per kilowatt-hour" from 2 to 1.8 cents. This reduction, together with previous reductions, effected annual savings over rates previously charged by privately owned companies amounting to \$9.60 or 21 percent to customers using 100 kilowatt-hours per month and \$123.60 to those using 750 kilowatt-hours (6 kw.) per month.

Pacific County Public Utility District No. 2 for the year ending December 31, 1942, increased its power requirements from 10,345,680 kilowatt-hours to 11,676,936 for the year, and its annual operating revenues from \$222,273.31 to \$237,479.61 or 6.84 percent. Total operating expenses for the same period had increased 5.14 percent, allowing a net operating income of \$61,050.95, an increase of 7.20 percent over the previous year and a net to surplus of \$52,904.69. Total annual reductions under present rates compared to those previously charged by private companies were estimated at \$51,121 or 25 percent.

Monmouth municipal system by March 31, 1943, had increased its sales by 467,009 kilowatt-hours over the previous year, or 47.2 percent; had reduced its rates or "revenue per kilowatt-hour," from an average of 1.649 to 1.368 cents, thus effecting an annual saving over former rates of \$13.20 or 31 percent to customers using 100 kilowatt-hours per month, and \$147 or 45 percent to those using 75 kilowatt-hours per month.

The city met all operating costs including interest, bond payments and taxes of \$13,311.60, and earned a surplus of \$1,734.13 in 1943 and \$8,170.81 in 1942, or a total surplus to date of \$9,904.94 which is \$4,995.44 in excess of the total debt charges, or 24.84 percent of gross revenue.

Forest Grove municipal system increased its total number of customers for the 12 months ending March 31, 1943, from 1,294 to 1,349, a gain of 55. Its kilowatt-hour sales for the period increased from 2,910,297 to 3,490,245 or 19.93 percent; its operating revenues from \$51,256.95 to \$56,797.96 or 10.81 percent. Operating income increased 23.27 percent. The city reduced the operating revenue received per kilowatt-hour from 1.749 to 1.61 cents during the period. This, added to previous reductions, resulted in an annual saving of \$13.68 over former rates to customers using 100 kilowatt-hours per month or 31 percent, and \$258 or 61 percent to those using 750 kilowatt-hours (6 kw.) per month.

The system paid all operating costs including city taxes of \$4,800, interest of \$7,500 and depreciation, leaving a net income of \$16,095.53. An amount equal to \$7,500 of deferred maintenance was set aside for post-war purposes. A building fund of \$12,000 was established.

McMinnville municipal system increased its total number of customers in the year ending March 31, 1943, from 2,362 to 2,406, a gain of 44; increased its total generated and purchased power from 10,435,552 kilowatt-hours to 11,223,971. The city reduced rates during the year from an average operating revenue per kilowatt-hour of 1.439 to 1.298 cents, effecting an annual saving of \$8.40 or 22 percent to

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The city met all operating costs including interest, bond payments and taxes of \$13,311.60, and earned a surplus of \$1,734.13 in 1943 and \$8,170.81 in 1942, or a total surplus to date of \$9,904.94 which is \$4,995.44 in excess of the total debt charges, or 24.84 percent of gross revenue.

Forest Grove municipal system increased its total number of customers for the 12 months ending March 31, 1943, from 1,294 to 1,349, a gain of 55. Its kilowatt-hour sales for the period increased from 2,910,297 to 3,490,245 or 19.93 percent; its operating revenues from \$51,256.95 to \$56,797.96 or 10.81 percent. Operating income increased 23.27 percent. The city reduced the operating revenue received per kilowatt-hour from 1.749 to 1.61 cents during the period. This, added to previous reductions, resulted in an annual saving of \$13.68 over former rates to customers using 100 kilowatt-hours per month or 31 percent, and \$258 or 61 percent to those using 750 kilowatt-hours (6 kw.) per month.

The system paid all operating costs including city taxes of \$4,800, interest of \$7,500 and depreciation, leaving a net income of \$16,095.53. An amount equal to \$7,500 of deferred maintenance was set aside for post-war purposes. A building fund of \$12,000 was established.

McMinnville municipal system increased its total number of customers in the year ending March 31, 1943, from 2,362 to 2,406, a gain of 44; increased its total generated and purchased power from 10,435,552 kilowatt-hours to 11,223,971. The city reduced rates during the year from an average operating revenue per kilowatt-hour of 1.439 to 1.298 cents, effecting an annual saving of \$8.40 or 22 percent to

domestic customers using 100 kilowatt-hours per month, and \$147 or 47 percent for such customers using 750 kilowatt-hours (6 kw.) per month.

Meanwhile the system met all operation and depreciation costs, paid \$26,400 interest to the city, paid \$3,925.79 taxes and had a net income for the period of \$19,272.64. Total earned surplus, accumulated since the beginning of Bonneville Power Administration service, was \$40,893.40.

The Inland Empire Cooperative, Inc., operating in eastern Washington, one of the largest in the United States, began operation in 1938 but did not begin using Bonneville power until August 1942. Securing Bonneville power at once reduced the cooperative's annual wholesale power cost by \$32,851. This in turn effected annual savings of \$12 or 16 percent to retail customers using 100 kilowatt-hours per month, and \$78 or 25 percent to those using 750 kilowatt-hours per month.

By the end of 1943 the cooperative had 2,010 miles of energized lines and 3,293 consumers. Its operating revenues for the year were \$193,833.44; expenses were \$155,333.86.

OTHER SALES

By June 30, 1943, three power contracts with private utilities companies were operative. Deliveries had been continued through the year to the Portland General Electric Co. on a day-to-day extension of the terms of the contract first executed in December 1939. Efforts to negotiate a long-term contract with the company were not successful due largely to the fact that the parent company, which owns all of Portland General Electric Co.'s common stock is in reorganization and negotiations had to be conducted with a number of parties who had diverse interests in that reorganization. Agreement could not be reached with all of these diverse interests on terms which would comply with the Bonneville Act and adequately protect the Federal Government's interest. This inability to agree on a long-term power contract resulted in the filing of two lawsuits against the Administrator. The purposes of these suits were to determine the terms under which the Administrator may enter into long-term power contracts with privately owned utilities. The Administrator, however, has continued to serve the growing demands of this company's system on a day-to-day basis because of the shortage of generating capacity in the Portland area.

As the fiscal year closed, the Bonneville Administration was furnishing the operating company approximately 70,000 kilowatts of monthly billing demand—about one-third of its total power requirements.

Other power sales contracts with utility companies at year's end were in force with the Pacific Power & Light Co., with a delivery point at Astoria, Oreg., for a demand of 2,000 kilowatts; and an interchange contract with the Washington Water Power Co. and the Pacific Power & Light Co., which included transfer service to public-owned distribution agencies under contract to the Bonneville Administration.

In addition to its sales contracts, the administration had in force a large number of pole contact and miscellaneous amendatory agreements. Contract actions of all types during the fiscal year totaled 125 items, as follows:

Summary of contract actions fiscal year 1943

<i>Type of Item</i>	<i>Number of Items</i>
Strictly new customers.....	20
Amendments or new agreements with existing customers for additional power.....	13
Revisions to apply revised wholesale rate schedules.....	12
Pole contact agreements, including amendments and supplements thereto.....	5
Miscellaneous amendatory agreements.....	25
Miscellaneous agreements.....	29
Supplemental agreements in regard to transfer service for Bonneville's account under the interchange contract of April 1, 1942, with The Washington Water Power Co. and Pacific Power & Light Co.....	21
Total.....	125

III. FUTURE POWER SALES

On June 30, 1943, 11 contracts involving an over-all minimum demand of 237,000 kilowatts and a possible maximum demand of 312,000 kilowatts were in active negotiation. Individually, these sales prospects ranged from 2,000 to 120,000 kilowatts of demand. They included the new electro-development laboratory and the new alumina reduction plant approved during the fiscal year 1943, as well as a number of new war industries, military establishments and several utilities systems. It was anticipated execution of these contracts during the fiscal year 1944 would bring total contract demands on the Bonneville-Grand Coulee system to nearly 1,300,000 kilowatts, with actual monthly billing demands probably running well in excess of that figure at times.

MARKET DEVELOPMENT SHOWS RESULTS

Industrial progress of the Pacific Northwest region clearly stated, during the fiscal year 1943, the importance of a strong market development program; and as the year drew to a close, it became increasingly apparent that this phase of the Board of Economic Warfare Administration's activities had materially assisted not only in the development of the region's war industry but in providing a foundation for future industrial expansion.

Strenuous efforts were made toward stabilizing the troubled aluminum manufacturing industry. Of the six huge Northwest aluminum plants, four were built by the Defense Plant Corporation and operated under lease as war plants. In order to safeguard the continued operation of such industries as permanent enterprises, the Administration's Market Development staff concentrated its efforts on the establishment of a plant for the manufacture of aluminum oxide from local Northwest clays.

As the fiscal year drew to a close, agencies of the War Production Board and the Bureau of Mines approved the establishment of an aluminum oxide plant in the Pacific Northwest. This plant, with a production capacity, will be constructed and operated in its initial stages by the Chemical Construction Co., an affiliate of the Canadian Cyanamid. Plans for this plant, as approved by the interested agencies, require that it be operated ultimately by the Columbia Metals Co., owned and financed by a group of Northwest businessmen.

During the year the Administration was also able to be of assistance to the Bureau of Mines in the establishment of an industrial development laboratory in the region. This laboratory, under construction as the year closed, was to investigate the feasibility of using the many large deposits of Northwest minerals through the application of low-cost electric power.

In addition to this work, the Administration's Market Development staff continued to cooperate with chambers of commerce and other public and semipublic agencies of the region in the development of community industrial surveys. More than 20 such surveys were completed during the fiscal year. Results were published by the Administration with the inclusion of complete information on available industrial plant sites, raw material and labor supply, transportation and housing facilities and other pertinent factors.

These reports were made available to a large number of interested organizations, for the purpose of encouraging them to con-

Pacific Northwest as a suitable region for the expansion of their enterprises.

All these activities brought substantial recognition of the program's value from a number of industrial sources. Typical was the comment of the industrial publication *The Iron Age*, which, in its issue of May 20, 1943, stated:

. . . The Bonneville-Coulee Power Administration in its business development and industrial analysis departments has now become a general agency and factor in the industrial life and future of the Pacific Northwest which is not only primary but which has become constantly more constructive and beneficial.

THE POST-WAR POWER MARKET

As the United Nations gained victory after victory during 1943, it became necessary, in the interest of good management, for the Bonneville Administration to consider the effects of the post-war period upon its power market. Furthermore, this was required by a Presidential memorandum on May 22, 1943.

The post-war problem, as it directly affected Bonneville, was twofold: (1) the stabilization and expansion of power-using industry; and (2) the development of the rural and domestic use of low-cost electric power.

Accordingly, it was toward the solution of this dual problem that the Bonneville Administration began to shape a post-war program, to be undertaken as soon as possible, for the approval of the Congress, the Department of the Interior and the War Production Board.

Stabilization of the immense Northwest aluminum industry comprised one of the largest single phases of the problem. In order to determine what steps were necessary to this stabilization, consideration was given to a study of the competitive position of existing aluminum plants, an analysis of the Defense Plant Corporation contracts for each of the plants, and finally, to the active promotion of steps to provide continuing operations on a competitive basis, by businessmen of the region.

With this proposal, consideration was given to methods whereby post-war aluminum markets could be developed in and accessible to the Northwest region.

Along with this, the possibilities of assisting in further research relative to other power-using industries were being considered.

Active consideration also was being given to plans for expansion of the rural and domestic power market. Rough estimates arrived at during the fiscal year indicated that, with proper development, irri-

gation, rural electrification and domestic power use would require, during the first post-war decade, an additional generating capacity in the Pacific Northwest of about 1,700,000 kilowatts.

All these aspects of the post-war problem as it would affect the Northwest power market were being pulled together for consideration by the proper Government bureaus and the Congress during the fiscal year 1944. Such studies were considered not only to be fundamental to the proper administration of the Bonneville Act, but of considerable importance to future protection of the Pacific Northwest economy.

IV. GROWTH AND OPERATION OF THE SYSTEM

At the beginning of fiscal 1943 the Administration had on hand a total of \$55,365,170 in unexpended congressional appropriations. This sum included the 1943 appropriation of \$20,007,000 for facilities required for war power deliveries, a carry-over from former fiscal years of \$26,000,000 which were being maintained as a reserve for projects authorized prior to the war but which could not be built during the critical material shortage, and approximately \$8,700,000 which had been allocated to specific projects then under construction.

On October 20, 1942, the chairman of the War Production Board halted all nonmilitary construction projects generally throughout the United States, pending review by a special Facilities Review Committee to determine which could be postponed as least essential to the war program.

On November 17, 1942, the Bonneville Administrator was ordered by the Facilities Review Committee to continue the agency's 1943 construction program to completion. The committee's findings showed that without exception the 23 major construction projects reviewed, as well as a number of smaller, related projects, were all of first importance to the Northwest's war production program.

POWER SYSTEM EXTENDED

In accordance with this approval, the Administration completed and energized 695 circuit miles of transmission line during fiscal 1943, of which 495.6 circuit miles were of 230 kilovolt construction. The Bonneville system's power substations were increased in number from 37 to 51 during the same period. Substation transformer capacity was increased by 733,667 kilovolt-amperes—a substantial gain over the 530,050 kilovolt-amperes of substation capacity installed during the previous fiscal year.

By June 30, 1943, the Administration had in operation a total of 2,443 circuit miles of transmission lines and a total substation transformer capacity of 2,049,579 kilovolt-amperes.

OPERATIONS

All facilities of the entire system were taxed to their utmost throughout the year. During the fall months of calendar year 1942, the unprecedented drought conditions on all Northwest power streams, with the single exception of the Columbia River, made it necessary for Bonneville to operate without adequate reserves of generating or transmission capacity. At times the generators at Grand Coulee and Bonneville were overloaded well in excess of 10 percent as an emergency measure. Following the extreme low-water period in the fall months of 1942, added demands by war industry throughout the Northwest made it necessary to continue overload conditions much of the time.

THE NORTHWEST POWER POOL

The principal emergency operations measure undertaken during the year was the development of the Northwest power pool in cooperation with 10 other major utilities serving the entire Pacific Northwest region. Prior to the beginning of the fiscal year 1943, the Bonneville Administration's system was already interconnected with several major utilities systems. In order to forestall the development of area-wide power shortages within the region and to make available at all times maximum power for war production within six Northwest States, arrangements for interconnections with six other major utilities systems were completed, with the concurrence and sponsorship of the War Production Board, in April of 1942. Later the War Production Board endorsed and made mandatory such interconnection programs by its Limitations Order L-94, issued May 1, 1942.

Actual operations of the Northwest power pool began August 1, 1942—one month after the beginning of the fiscal year. During the 11-month period between August 1, 1942, and June 30, 1943, the Bonneville Power Administration made total energy deliveries to other pool members of 1,365,911,630 kilowatt-hours.

During this same period, energy received by the Bonneville Administration from other pool members totaled 406,294,365 kilowatt-hours. This made the Government's net contribution to the Northwest power pool 959,617,265 kilowatt-hours during the 11-month period.

Thus, in addition to direct power deliveries to Bonneville's own war customers, the two Federal dams on the Columbia River contributed

nearly 1 billion kilowatt-hours to fill the wartime needs of other utility systems.

THE POWER-SUPPLY PROBLEM

On June 30, 1943, combined installed rated generating capacity at the Bonneville and Grand Coulee plants totaled 884,400 kilowatts. Additional units totaling 432,000 kilowatts were undergoing construction and installation. Completion of these latter units was scheduled to increase combined rated capacity at both plants to 1,316,400 kilowatts by the spring of calendar year 1944. In addition, U. S. Army engineers were engaged in raising the pool elevation behind Bonneville Dam for the purpose of adding 29,000 kilowatts of prime power capacity to the over-all system total.

Estimates by Bonneville engineers in the spring of 1943 indicated that in the 12 months immediately following final installation of this capacity, the total average load on the Bonneville system would rise as high as 1,038,400 kilowatts, of which 97 percent would comprise deliveries to war industries and military establishments. It was estimated that during the same period the loads for the interconnected utilities systems, excluding the Bonneville-Grand Coulee system, might exceed the dependable generating capacity of these other systems by 100,000 to 200,000 kilowatts if the year proved to be one of low water. In such event, the Bonneville-Grand Coulee system would have to supply the deficiency.

These and other pertinent factors were presented to the Bonneville Advisory Board at a meeting in Washington, D. C., on March 12-13, 1943.

In its consideration of these matters, the Advisory Board came to the conclusion that, if the war continued, there was some danger of a region-wide power shortage in the winter of 1944 and almost certain danger of such a shortage in the winter of 1945 and thereafter.

Accordingly, at its March 12-13 meeting, the Advisory Board recommended the following program:

(1) Rapid completion of generating units already under construction at both dams.

(2) Rapid completion of the City of Seattle's Ross Dam and the 35,000-kilowatt unit at the city of Tacoma's Nisqually project.

(3) Increase in the level of the Bonneville pool.¹

(4) Reinstatement immediately, with adequate priorities, of generator No. 7 at Grand Coulee for service in 1944, if possible.

(5) Arrangement for completion of Rock Island project.

¹ This had already been undertaken by the U. S. Army engineers.

(6) Investigation of the possibility of developing not less than 3 million acre-feet of water storage on the Clark Fork of the Columbia River.

(7) Reinstatement, with adequate priorities, of generating units 8 and 9 to be installed at Grand Coulee Dam by 1945.

(8) Action to insure immediate construction of substantial additional power supply for 1946 and subsequent years by construction of the Umatilla project.

Upon presentation of these recommendations, the War Production Board concurred in a number of them, including the proposal to investigate the possibilities of storage projects in the Clark Fork watershed. As the fiscal year closed, the Clark Fork investigations were in an advanced stage; and on June 28, 1943, the War Production Board approved the construction and installation of Grand Coulee generating unit No. 7.

Depending upon successful conclusion of these negotiations for upstream storage and completion of Coulee Generator No. 7, the Administration anticipated any power shortage developing in 1945 could be adequately met.

POST-WAR CONSTRUCTION PROGRAM

On May 22, 1943, in a memorandum to the heads of all departments and agencies, the President of the United States requested the submittal of detailed construction plans for public works which had been deferred because of the war, along with proposed supplemental appropriations required for effectuating such plans and suggestions as to additional legislation which might be required to implement them.

In accordance with this order, the Bonneville Administration began work on a detailed post-war construction program. As the year closed, initial estimates indicated the Administration would be prepared, on demobilization day, to call for bids on \$26,000,000 worth of projects.

This backlog represented about 45,000 man-months of labor and an expenditure of at least \$15,000,000 for equipment and materials.

Money for these projects already had been appropriated by the Congress prior to and during the early months of the war and was being held in reserve for continuance of the agency's peacetime program.

In addition to this sum, it was estimated that at least \$25,000,000 more must be spent, following the war, on Bonneville's huge network of transmission lines, if the Congress appropriated funds for addi-

tional generators at Grand Coulee Dam and for construction of the \$90,000,000 Umatilla Dam.

The initial \$26,000,000 program included nearly 35 individual projects involving additions to existing substations, construction of new substations, construction of new high-voltage transmissiin lines and extensions to Bonneville's subtransmission system. The plan also included about \$11,000,000 of expenditure for a wide variety of service lines, substations and other facilities for the delivery of Columbia River power to public distribution agencies in Oregon and Washington.

It was the Administration's view that such a program was in conformance with Department of Interior policy to build Northwest power facilities in advance of need.

Such a policy had already paid high dividends, both in promoting industrialization prior to the war and in heavy contribution to war production following Pearl Harbor.

Division of Power

ARTHUR GOLDSCHMIDT, Acting Director

THE INCREASING number and complexity of the power problems of the Department during the past year resulted in a great increase in the work of the Division of Power. In large part, the added problems were a direct consequence of the tremendous expansion of the power facilities under the control of the Department. Work of the Division was further augmented by the fact that the power program of the Department is in general undergoing a transition from a construction stage to an operations and marketing stage, with present emphasis upon the disposition of power to meet the demands of the war program. Problems of policy and practice dealing with marketing and related activities require considerably more of the attention of the Secretary and of this Division than do problems of construction. For the most part construction problems have related to the action of the War Production Board in curtailing construction and equipment installation on several of the most important of the partially finished projects of the Department. The shift in emphasis in the war program from the production of materials and munitions to the production of food and the conservation of fuel and manpower, has further enhanced the value of hydroelectric projects of the Department which combine irrigation and power features.

As a result of 2 years of experience in which an efficient working procedure between the Division of Power and the Department's power operating agencies in the field has developed, an order of the Secretary was issued further formalizing the relationship between the Division of Power and the agencies and codifying the tested procedural arrangements. The order effectively summarizes the function of the Division as follows:

The Division of Power assists the Secretary in supervising the discharge of the Department's responsibilities in electric power matters. The primary

duties of the Division of Power are to assist (1) in the formulation and coordination of the Department's objectives, policies and programs to encourage and facilitate the most widespread use of electric power in the public interest and, during the present emergency, to assure the most effective utilization of the Department's power resources in the prosecution of the war; (2) in the prompt dissemination to the bureaus and offices of information as to the Department's objectives and policies; and (3) in the supervision of the application and prosecution of these policies and programs.

The order provides for the handling of contractual matters, statistics and reports, rates, budget matters, market development programs, findings of feasibility and construction programs. The resources and personnel of the Division are made available to all bureaus and offices of the Department, whether directly concerned with power or not, in the development of programs affecting power. With the issuance of this basic manual of administrative responsibility and practice the Division of Power has established a sound basis for the administration of far-flung and varied power developments under the jurisdiction of the Department of the Interior.

EXPANSION AND UTILIZATION OF FACILITIES

The major portion of the power from Department projects is sold wholesale to war industries and military and naval establishments and to public and private distributing agencies. The great volume of power which has been made available for war purposes by plants of the Department has played a most important and in some respects a crucial role in the ability of the Nation to meet war production demands. It is estimated that generators in the power plants of the Department will produce, and the agencies of the Department will dispose of, approximately 14,900,000,000 kilowatt-hours of electrical energy in 1943. This is an increase of nearly 300 percent over the Department's power production of 1940. The most significant increases during the past year have been at Grand Coulee where four 108,000- and two 75,000-kilowatt generators are now in service. Two more 108,000-kilowatt units are scheduled for operation shortly. The Green Mountain plant of the Bureau of Reclamation, first of the plants of the Colorado-Big Thompson project, also began operations with a capacity of over 20,000 kilowatts. The Parker Dam project on the Colorado River in Arizona and California with an installation of 120,000 kilowatts reached full production early in 1943. At the end of the fiscal year final tests were being completed at the Fort Peck project, a United States Engineers' project on the Missouri River in Montana for which the Department has by act of Congress been given the responsibility of marketing the power.

The Division of Power endeavors to see that the power facilities of the Department are used to the utmost in the war program by ordinary direct sale as well as by special arrangement where necessary. During the year an agreement was effected by the Bureau of Reclamation and the Indian Service to pool power on the Parker Dam transmission system in Arizona, utilizing power generated from the San Carlos project of the Indian Service and by several private utilities in the area, in order to guarantee adequate power for the magnesium plant in Las Vegas and other war loads in the area. In line with the President's directive to war procurement agencies and the Federal Power Commission to arrange for the purchase of power from the cheapest reliable sources, the Division asked the agencies of the Department to keep abreast of present and prospective war loads in order to determine whether and how they may be served more economically from facilities of the Department.

One of the fundamental power policies of the Department is that the abundant power resources under its jurisdiction be so managed as to assure the widest possible use of electric energy at the lowest possible cost to the consumer. In addition to searching for means of effecting economies by means of transmission and delivery arrangements, the Division is constantly endeavoring to keep the rates for power sold by the Department to the lowest level feasible under the law and compatible with good business practice. To this end, during the year the Division consulted with and advised a number of other agencies of the Government including the Defense Plant Corporation, Federal Power Commission and the National Housing Agency. The staff of the Division has also been actively engaged for several months in basic technical and other work involved in a reduction in wholesale power rates for all Reclamation power projects in Wyoming. The Division has made standard in the Department the practice of securing from purchasers of power for resale an agreement that resale rates will be kept at the lowest feasible level in order to assure that the benefits of low cost power developed at the projects of the Department are passed on to the ultimate consumer and also to assure a continuing market for the Department's power.

During the year the War Production Board stopped construction on the Anderson Ranch Dam in Idaho, the Davis Dam in Arizona, the Colorado-Big Thompson project in Colorado, and the Keswick Dam in California. Projected power machinery installations at Grand Coulee Dam and the Shasta Dam in California were cut. The Division participated actively and with partial success in the efforts of the Department to obtain revocation or modification of these stop orders to prevent waste, and to provide for a safe margin of power capacity in

the war program, to save manpower and fuel and to increase food production.

CONTRACTS

During the past year the Division has reviewed 90 contracts for the sale of power from the many projects of the Department to consumers or distributing agencies, public and private. Approximately one-half of these contracts involved the sale of power to war industries and naval and military establishments. Contracts of the latter kind accounted for far more than half of the aggregate amount of power sold and the technical and policy problems presented by such contracts were much more intricate than those presented by the nonwar contracts. In addition to the review of contracts, with the technical and legal work required therefor, the Division has participated in the negotiation of several of the larger war contracts of both the Bureau of Reclamation and the Bonneville Power Administration. Although it is a basic policy of the Department to decentralize the administration of its power projects, during this war period certain important negotiations with other agencies of the Government must necessarily be handled in Washington. The Division has been able to effect a saving in time and money by carrying on and unifying such activities. In addition, constant negotiation of a general nature with the War Production Board, other Federal agencies and representatives of groups wishing to obtain power has been necessary.

CENTRAL VALLEY

Members of the staff of the Division are participating in several of the studies now under way for the Central Valley project in California. These studies, which are under the direction of a representative of the Bureau of Reclamation and are being made by committees upon which are representatives of various groups and interests, Federal as well as local, encompass all of the many problems to be encountered in the development and operation of this vast project. A number of the problems directly or indirectly involve the power features of the project.

Throughout the past year the Division and the Bureau of Reclamation have been engaged in negotiating a contract for the sale of a large block of power from the Shasta Dam power plant to the Pacific Gas & Electric Co. Due to lack of facilities for line construction, power from the first two 75,000-kilowatt generating units that the War Production Board has allowed to be installed must be sold to the company during the war, so that it may be devoted to war uses with the least expenditure of critical materials.

MISCELLANEOUS

During the year the Division assisted in the drafting of new regulations governing the granting of right-of-way easements for transmission lines over lands under the jurisdiction of the Department. The Division was also able to suggest special conditions or stipulations for the full protection of the public interest in a number of the right-of-way permits reviewed. The Division continued to take part in the handling of the legislative problems of the Department which relate to or affect power. Among the matters of this kind which required attention were two compacts for the apportionment of the waters of interstate streams. The Division also advised and assisted the other agencies, particularly the Bonneville Power Administration, with questions of litigation having important policy implications.

Four major problems were active in the Division at the end of the year. Careful study was being given to the report of the Bureau of Reclamation upon the proposed Canyon Ferry irrigation and power project for the upper Missouri River near Helena, Mont. The reports and recommendations of the representatives of the Department engaged in working out the allocation of costs of the Grand Coulee Dam project between power, irrigation, and other uses were almost ready for submission to the Commissioner of Reclamation, the Administrator of the Bonneville Power Administration and the Director of the Division in order to provide the Secretary with a basis for determining the final cost allocation. Members of the staff of the Division were also working with the Bureau of Reclamation on plans for the disposition of power from the Fort Peck project in Montana and in North Dakota where the power can serve the Nation at war by replacing gas fuel and permitting increased irrigation for food production. Study was being given to the administrative and legal relationship between the Department and the Salt River Valley Water Users Association in Arizona in cooperation with that association.

Division of Territories and Island Possessions

BENJAMIN W. THORON, Director

DURING the past year the Division has been reorganized to meet more effectively the increasing and complex problems in the Territories and islands as a result of their strategic location in the war picture. It has worked closely with other agencies and Departments of the Government in an effort to coordinate programs and eliminate duplication of activities. Each area is confronted with unique problems and each requires individual solution. The Virgin Islands and Puerto Rico were in a particularly critical situation as a result of the shipping shortage and submarine activity in the summer and fall of 1942. Here an acute crisis in the supply of the necessities of life was narrowly averted by the Civilian Food and Supply Unit, established to carry out the provisions of Public Law 371, Seventy-seventh Congress, working in close cooperation with the Department of Agriculture and the War Shipping Administration to supply the immediate needs of the people of these areas.

As part of the operation, it was contemplated originally that stock piles of food, drugs, hospital supplies and other materials, supplies and equipment would be established at carefully selected points in order to meet the emergency needs of the civilian population in the event that Alaska, the Virgin Islands, or Puerto Rico should be cut off from the mainland through enemy action or shipping service disrupted to such an extent that regular supply was found impossible. Plans were formulated for the establishment of such stock piles and a quantity of food and medical supplies for this purpose was shipped to the Virgin Islands in early 1942.

In the case of Puerto Rico, shipping suffered increasingly because of enemy submarine action during the spring and summer months of 1942 to such an extent that the supply of the island was seriously threatened and it became necessary, in order to insure that food necessary to feed the Puerto Rican people would reach the island in

the available shipping space, that the Food Distribution Administration (then the Agricultural Marketing Administration) of the Department of Agriculture purchase and ship the basic food requirements. An agreement was reached between the Department of the Interior and the Department of Agriculture under which the FDA would furnish and, acting for this Department, distribute by sale to wholesalers in Puerto Rico the different food items in accordance with estimates of requirement set up by this Department. Many difficulties were encountered at the outset in placing the operation in effect, not the least of which was the very limited amount of shipping space which was made available for Puerto Rican service during the latter part of 1942 and January 1943, due to the extreme need for vessels in other war areas. Since last February, the War Shipping Administration has increased shipping to Puerto Rico to such an extent that it has been feasible to bring stocks of all necessary food items in Puerto Rico to a very satisfactory level. Also, shipments of supplies needed by industry, as well as consumption foods, have been made in such quantities that the Puerto Rican supply situation generally is in a good and satisfactory condition. This has been made possible by the agreement between the War Shipping Administration and the Department that after September 1, 1942, all cargo space on ships sailing for Puerto Rico, with the exception of military vessels, would be allocated by the Department of the Interior and that only cargo approved by this Department would be loaded. Such action has insured that the food and general supplies most needed in the Island would be loaded in the available shipping space. By January 1943 a plan was put in operation through which applications for importation of goods, other than food, would be cleared by the General Supplies Administration, a Puerto Rican governmental office, before the Civilian Food and Supply Unit would allocate steamship space. This plan has worked out most satisfactorily and is in line with the desire to forward supplies in accordance with priorities set up by the Puerto Rican Government in consultation with representatives of local business and industry.

In all plans for shipping Puerto Rico and the Virgin Islands have been considered jointly, since there have been no large vessels going directly to the Virgin Islands and all supplies consigned to the Virgin Islands must be transhipped from San Juan. The FDA has also acted in a similar capacity for the Virgin Islands.

The establishing of emergency stock piles has been carried out in Alaska. Large shipments of food and other supplies necessary for the civilian population in case of need were made in the fall of 1942 and suitably warehoused at a number of strategic points in the Terri-

tory. The facilities of the Native Stores of the United States Indian Service have been utilized to the fullest possible extent in carrying additional emergency supplies wherever such stores are in operation. Recently it has been found advisable to place in normal consumption channels or sell to the military forces practically all of the food supplies which were sent to the Territory last year. This has been accomplished in a satisfactory manner and replenishing the stock piles with fresh supplies has been moving forward for several months and will continue. In addition, every assistance possible has been rendered to the exporters to Alaska in the obtaining and shipping of food and other supplies in order that normal consumption requirements of the Territory could be met in a satisfactory manner.

The influx of Army, Navy, and civilian workers into Alaska has made a heavy drain on local resources already strained to capacity as a result of military operations. Labor turn-over has been heavy with the various agencies competing for the available supply. The Alaska Railroad particularly has suffered as a result of the shortage and recruitment of qualified personnel has been carried on with the help of the War Manpower Commission. In spite of these handicaps and the added fact that the winter was one of the most severe in the history of Alaska, the railroad maintained its schedules almost without interruption and kept the flow of supplies and military equipment moving steadily.

As the possibility of a Japanese attack on Hawaii appeared to become more remote, consideration was given to the return to civilian control many functions that had been taken over by the military in Hawaii when martial law was declared immediately after the December 7 attack. Accordingly, in August this Department joined with the Department of Justice in opening negotiations with the War Department for the restoration of civil jurisdiction and the distribution of governmental functions in the Territory of Hawaii as between the civilian and military authorities. All angles of the problem were thoroughly explored and an agreement reached as a result of which, on February 8, 1943, proclamations were issued in Hawaii simultaneously by the Governor of Hawaii and the Commanding General of the Hawaiian Department restoring specific functions to civilian control.

The program of civilian defense protection in Hawaii continues to maintain a high degree of efficiency and progress. One of its outstanding accomplishments was the establishment of an emergency poliomyelitis hospital. In the operation of the hospital the U. S. Army cooperated to the fullest extent by detailing 22 nurses and 13 Medical Department soldiers to comprise the staff of the unit. The people

the available shipping space, that the Food Distribution Administration (then the Agricultural Marketing Administration) of the Department of Agriculture purchase and ship the basic food requirements. An agreement was reached between the Department of the Interior and the Department of Agriculture under which the FDA would furnish and, acting for this Department, distribute by sale to wholesalers in Puerto Rico the different food items in accordance with estimates of requirement set up by this Department. Many difficulties were encountered at the outset in placing the operation in effect, not the least of which was the very limited amount of shipping space which was made available for Puerto Rican service during the latter part of 1942 and January 1943, due to the extreme need for vessels in other war areas. Since last February, the War Shipping Administration has increased shipping to Puerto Rico to such an extent that it has been feasible to bring stocks of all necessary food items in Puerto Rico to a very satisfactory level. Also, shipments of supplies needed by industry, as well as consumption foods, have been made in such quantities that the Puerto Rican supply situation generally is in a good and satisfactory condition. This has been made possible by the agreement between the War Shipping Administration and the Department that after September 1, 1942, all cargo space on ships sailing for Puerto Rico, with the exception of military vessels, would be allocated by the Department of the Interior and that only cargo approved by this Department would be loaded. Such action has insured that the food and general supplies most needed in the Island would be loaded in the available shipping space. By January 1943 a plan was put in operation through which applications for importation of goods, other than food, would be cleared by the General Supplies Administration, a Puerto Rican governmental office, before the Civilian Food and Supply Unit would allocate steamship space. This plan has worked out most satisfactorily and is in line with the desire to forward supplies in accordance with priorities set up by the Puerto Rican Government in consultation with representatives of local business and industry.

In all plans for shipping Puerto Rico and the Virgin Islands have been considered jointly, since there have been no large vessels going directly to the Virgin Islands and all supplies consigned to the Virgin Islands must be transhipped from San Juan. The FDA has also acted in a similar capacity for the Virgin Islands.

The establishing of emergency stock piles has been carried out in Alaska. Large shipments of food and other supplies necessary for the civilian population in case of need were made in the fall of 1942 and suitably warehoused at a number of strategic points in the Terri-

tory. The facilities of the Native Stores of the United States Indian Service have been utilized to the fullest possible extent in carrying additional emergency supplies wherever such stores are in operation. Recently it has been found advisable to place in normal consumption channels or sell to the military forces practically all of the food supplies which were sent to the Territory last year. This has been accomplished in a satisfactory manner and replenishing the stock piles with fresh supplies has been moving forward for several months and will continue. In addition, every assistance possible has been rendered to the exporters to Alaska in the obtaining and shipping of food and other supplies in order that normal consumption requirements of the Territory could be met in a satisfactory manner.

The influx of Army, Navy, and civilian workers into Alaska has made a heavy drain on local resources already strained to capacity as a result of military operations. Labor turn-over has been heavy with the various agencies competing for the available supply. The Alaska Railroad particularly has suffered as a result of the shortage and recruitment of qualified personnel has been carried on with the help of the War Manpower Commission. In spite of these handicaps and the added fact that the winter was one of the most severe in the history of Alaska, the railroad maintained its schedules almost without interruption and kept the flow of supplies and military equipment moving steadily.

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of Hawaii have maintained splendid morale and continue to work at the grim business of war with high courage and devotion to duty.

Steady progress has been made in the adjustment of the Puerto Rican hurricane relief loans made by the former Hurricane Relief Commission from 1929 to 1933. Loans adjusted to June 30, 1943, number 852. The total amount collected is \$706,213.12. Much opposition encountered in the past to the settlement of these loans has now almost disappeared and with better cooperation from the borrowers it is expected that the number of adjustments will rapidly increase. Minor crops are being raised in connection with the war program for which the farmers are receiving better prices, and it is a good sign to observe that this increased income is being used in liquidating old debts and the freeing of their properties from the mortgages held by the Government.

A more detailed report of activities in each area follows:

TERRITORY OF ALASKA

War is still the overshadowing fact in Alaska. The inhibitions which existed a year ago against detailed discussion of the great transformation wrought by military requirements still prevail to a considerable degree. This much, however, may be said: with the recapture of Attu and the isolation of the Japanese on Kiska, the defensive stage of war in Alaska has ended. The initiative is now wholly with the United States. The destruction of the enemy on Kiska is as much of a certainty as any future event in war may be deemed to be. The only important question remaining in regard to Kiska relates to the time when the high naval command, to which has been delegated the responsibility of expulsion of the Japanese from the Aleutians, decides to take the necessary action. Kiska is isolated and completely neutralized and Alaska has become a thoroughfare for offensive action further west. This dramatic and important change may be said to coincide with the termination of the fiscal year 1942.

In the development of the campaign to drive the Japanese invader from North America, the Aleutian islands, previously almost uninhabited (west of Umnak the only settlements were on Atka and Attu) have been galvanized into great activity. The offensive power of the United States in the Pacific has been greatly strengthened thereby and extended farther west in the North Pacific than ever before. At the outbreak of the war, Dutch Harbor, at the inner (eastern) end of the Aleutians, represented the farthest west of our military establishments in the Pacific. Pearl Harbor, in the Hawaiian Islands, is on the 158th parallel of west longitude. Dutch Harbor is

between the 166th and 167th. Our fortifications now extend to the end of the Aleutian chain, and it has become the northern half of the Pacific pincers which will ultimately close on the Japanese enemy. Attu, astride the 173d parallel of longitude east, has now become our farthest west military base on American soil, and, with Amchitka, constitutes our first base on American soil in the eastern hemisphere in this war.

As the tide of military action has swept westward, the military bases on the Alaska mainland, originally constructed for defensive purposes, have diminished in activity and importance and have become increasingly depots for the transshipment of men, matériel, and supplies, to the western front. The requirements of transshipment and transportation have brought important changes to Alaska, the most striking of which is the Alaska Military Highway. This route, the construction of which was begun in the spring of 1942, connects Dawson Creek in British Columbia (northern terminus of our international continental railroad system) by highway with the Alaska system of roads. The chief value of this military highway to date has been in connection with the maintenance of an airway which passes from Minneapolis through Edmonton and Whitehorse to Alaska. This airway has proved its value and establishes a new method of ingress and egress from Alaska—formerly all Alaska traffic passed through Seattle. Of considerable potential significance for Alaska is the 151-mile branch road destined for completion during 1943 from Haines at the upper end of the Inside Passage to meet the Alaska Military Highway 108 miles west of Whitehorse. A road 42 miles in length already extended from Haines to the Canadian boundary. Its extension by 109 miles over the Chilkat Pass and the historic Jack Dalton Trail links the southeastern Alaska "panhandle," hitherto unconnected, with the new international highway system and should constitute the most direct and least costly route from the United States to interior Alaska. A direct overland telephone system from Alaska to the United States is an important accompaniment of this highway construction.

Immediately after the outbreak of war the Governor requested legislation of the Congress to permit the organization of a Territorial Guard, the four companies of the Alaska National Guard organized in 1940 having been inducted. It was his belief that as far as possible there should be no civilian spectators, no passive noncombatants, in Alaska, and that in the event of invasion, which was deemed a distinct possibility at that time and for a year thereafter, every able-bodied person should be prepared to fight. The authorized strength of the Alaska Territorial Guard is 6,000. One hundred and three units have

been organized, and the enrollment, in proportion to population, appears to be the largest of any State or Territory.

In the sale of war bonds, Alaska has consistently exceeded substantially. In the final month of the fiscal year 1943, Alaska was one of 5 States and Territories to do so. In that month Alaska was second in the Nation, exceeding all of the 48 States with a percentage of 114.5 and being second only to Hawaii.

An important concomitant of war has been the search for minerals in Alaska, whose mining hitherto was largely devoted to gold. Gold mining has been suspended for the duration except in those areas where its extraction is accompanied by the recovery of strategic minerals. The United States Bureau of Mines, in collaboration with the Territorial Department of Mines, is carrying on a search for minerals which has already resulted in the production of chromite, molybdenum, tungsten, and mercury. The development of deposits designed to stop the wasteful importation of coal from the States to satisfy Alaska's needs, is now under way.

THE ALASKA RAILROAD

The Alaska Railroad experienced one of the most difficult years in its history. This was due to a number of factors, the following:

The winter of 1942-43 was one of the most severe in the history of the Territory of Alaska. Intense cold prevailed for long periods; there was an unprecedented snowfall; severe floods occurred on several occasions causing considerable damage to roadbeds and bridges. A fire in a tunnel interrupted traffic for several weeks. Many employees were lost during the year whom it was impossible to replace. Despite these difficulties the railroad was called upon to transport an increased amount of supplies and equipment and move additional personnel in connection with military activities.

The employee problem was solved in part through the cooperation of the War Department, which assigned a railway operating detachment of enlisted men to assist in operation and maintenance. The War Department also rendered invaluable assistance in the securing of additional rolling stock to move the increased volume of freight being transported.

The construction of the new railroad cut-off, 14 miles in length, between Portage and Whittier, including two long tunnels, was completed during the year, and this new line was put into full operation. The necessary facilities at Whittier, including docks, railroad facilities, and utilities that are required for the transfer of freight from

railroad cars, were completed and put into operation. Construction of a new concrete depot and office building at Anchorage, was also finished during the year.

The coal mine at Eska, operated by the railroad, was improved to an extent that it was possible to increase materially the production of coal from this mine.

Freight and passenger service between Seward and Fairbanks, and branch lines serving the Matanuska farm colony and the coal fields, was furnished throughout the year, and river boat service was maintained on the Yukon and Tanana Rivers during the season of river navigation.

TERRITORY OF HAWAII

The fiscal year ending June 30, 1943, saw the Territory of Hawaii make great advances in fortifying the civilian population against every possible consequence of the war.

Hawaii is in the Pacific theater of World War II; it is the most important United States outpost in this area. As such it must expand and enlarge its facilities to accommodate the thousands of armed personnel and defense workers that have come here; it must take steps to educate and protect the resident population against enemy activities, both from within and without; it must cooperate with military, naval, and other agencies to make Hawaii impregnable and secure against every emergency. All these, and more, Hawaii has contributed and accomplished during the past 19 months.

Every man, woman, and child is aware of the importance of Hawaii as a base for our forces; everyone has willingly gotten behind the war effort and has made it possible, in such a short period of time, to put our area in readiness for the great offensive against Japan.

Under the direction and supervision of the Office of Civilian Defense, the whole territory is now honeycombed with bomb shelters and all vital civilian installations have been protected against damage by blinder and bomb-proof shelters. Emergency hospitals and auxiliary first-aid stations, manned by hundreds of volunteer nurses and aides, have been constructed throughout the Territory. Emergency evacuation camps, kitchens, and food storage places have likewise been erected in areas removed from military objectives.

The civilian population has been immunized, finger printed, and furnished gas masks and has been trained for fire fighting, first aid, gas defense, block patrolling, etc. The populated areas of Hawaii have been supplied with air-raid sirens, the water supply has been chlorinated against bacterial contamination; utility installations are under

constant guard; emergency police and fire reserves supplement the regulars.

The production of food has been increased to make Hawaii more nearly self-sustaining. The sugar and pineapple plantations have turned over thousands of acres of land for production of food for local consumption. This has relieved shipping space for other essential commodities and supplies. Hawaii, prior to the war, did not produce sufficient fresh vegetables to supply local needs. A monthly production of about 4,000,000 pounds before the war has been increased to approximately 8,000,000 pounds. Poultry, pork, and beef cattle production, though handicapped by shortage of feed, has nevertheless been able to hold its own through local feed production.

Mass influx of workers, overcrowding, black-out restrictions, and general inability to live normally under present conditions have created numerous problems of housing, hospitalization, sanitation and garbage disposal, disease control, juvenile delinquency, crime prevention, etc. The Territory is making every attempt to handle and alleviate these conditions.

Evacuation camps have been opened to homeless and distressed families. Approval for construction of some additional 1,000 housing units has been obtained but unless lumber and other essential materials are made available this project will fail.

During the past year four diseases—mumps, whooping cough, poliomyelitis, and influenza—became epidemic. These were quickly controlled and the casualty rate was low. Venereal diseases have also been satisfactorily controlled, the rate dropping to an unprecedented low of 4.5. Tuberculosis, however, due to living conditions, is on the increase with over 2,000 cases for the past year as against an average of 1,500 for prior years.

The Territory is on guard against the outbreak of tropical diseases. This is a constant threat on account of contact with armed personnel passing through from other Pacific areas.

Business has had a prosperous year. This is reflected in an increase of tax revenues, both Territorial and Federal. Defense jobs and the presence of thousands of armed personnel have accounted for increased purchasing power. Inflation, however, has been kept down by price fixing and rationing under the Office of Price Control and the Office of Civilian Defense.

There has been an acute shortage of labor in Hawaii. Defense activities, with higher levels of wages, attracted labor from local industries. Hawaii was designated a "critical labor area" with a net shortage of 14,000 workers, the bulk being required for agriculture and for Army and Navy agencies.

All governmental agencies of the Territory devoted their resources and personnel to aid and cooperate with military, naval, and Federal agencies. This will continue until victory is achieved.

The restoration of civil affairs to civil authorities on March 10, 1943, has had a healthy reaction on the community. It has relieved military personnel for military duties; it has returned to civilians the responsibility of administering their own affairs. Hawaii can well be proud of its record of accomplishments. It is eager to demonstrate that its people are capable of carrying their share of any responsibility and of performing any task necessary to assure the fullest safety of the islands.

PUERTO RICO

SHIPPING AND SUPPLY SITUATION

Other important developments during the year were overshadowed by the shipping shortage and its serious effects on the island's economy.

With its 2 million population the island normally is dependent upon the continent for a third of its food (by weight) and for almost all of its clothing and other essential commodities.

Puerto Rico's shipping first began to feel the effects of the war as early as March 1942. In June incoming civilian cargo fell to less than a quarter of normal receipts. The situation became extremely critical in September 1942 when civilian tonnage reached an insignificant level—7 percent of the 1940 monthly average.

The strenuous efforts of the Insular Government and the Federal Department of the Interior averted the disaster which appeared inevitable. Representations of the island's minimum shipping needs were made to the War Shipping Administration with the result that additional tonnage was made available. An agreement was reached between the Department of the Interior and the Department of Agriculture whereby these agencies undertook to supply the island with basic foods.

Before the tide finally turned, however, the economy of the island sank to a level not far above the point of disintegration. For a considerable period basic foods such as rice and codfish were virtually unobtainable. Wholesalers and retailers generally were threatened with bankruptcy by the depletion of stocks. Employment, according to data obtained by the Insular Department of Labor, was 40 percent less in January 1943 than in June 1942.

Improvement in the supply situation, which began to be noticeable in December 1942, continued at an increasing rate to the end of the fiscal year. As a result, our position at the end of the year was in general the reverse of that in which we found ourselves at the begin-

constant guard; emergency police and fire reserves supplement the regulars.

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ning of the year. Instead of critical shortages we had substantial surpluses of most basic commodities. Industry and business had revived, and this revival was reflected in employment figures. Employment in our manufacturing industries, for example, was only 5 percent less in June 1943 than in June 1942. The increase in shipping during the last half of the year also resulted in an export total for the year only slightly below normal.

CONGRESSIONAL COMMITTEES

During the year Puerto Rico was visited by two congressional committees—the Chavez Committee of the Senate and the Bell Committee of the House. Both committees held extensive hearings and made first-hand inspections of various phases of insular life. After returning to Washington the Chavez Committee continued to take an active interest in the island's problems and was extremely helpful in the solution of some of them, notably the shipping problem. The Bell Committee came to the island late in the fiscal year, and, therefore, it is not yet known what the results of its investigations may be.

RELIEF REQUIREMENTS

Due to Puerto Rico's lack of war industries, and to stagnation of business and industry as a result of inadequate shipping, the need for relief increased drastically. The work relief program carried on by the WPA was increased; the free food distribution program of the FDA was stepped up and, in addition, the insular legislature established an insular emergency program and appropriated \$16,000,000 to that agency for direct and work relief.

TREASURER

Despite the dark prospect at the beginning of the year, the Treasurer cautiously estimated probable receipts at \$28,000,000. The auditor gloomily estimated \$14,000,000. Actually, over \$41,000,000 was collected. This was an all-time peak, over \$4,000,000 more than the previous year. Income taxes accounted for much of the increase, collections rising from \$7,635,383 the previous year to \$11,312,371. During the year, the insular public debt was reduced from \$23,700,000 to \$16,398,000, the lowest level in 20 years.

DEPARTMENT OF JUSTICE

The Department of Justice had a busy year in the courts. There were a number of cases, involving income taxes, brought against the treasurer. The Department also cooperated with the Land Authority

in cases which sprang from enforcement of the 500-acre law. One important case led to a consent decree between the Government and the South Porto Rico Sugar Co., which was approved by the supreme court of Puerto Rico. Under its terms, some 22,000 acres of land will be conveyed to the Land Authority. Other consent-decree cases with large sugar companies are being negotiated.

LABOR

During the year there were numerous labor disputes due chiefly to economic pressure resulting from increasing living costs in the face of nearly static income. The Federal Conciliation Commissioner, who worked in close harmony with the Insular Department of Labor, intervened in 97 cases, and had remarkable success in effecting settlements. The Insular Conciliation Commissioner, who took office on March 8, handled 47 cases between that time and the end of the fiscal year.

The most serious dispute of the year involved 1,300 railroad workers. When these workers struck, the Governor immediately immobilized traffic for 48 hours and, thereafter, the ODT took over the management of the road under an Executive order of the President of the United States. The War Labor Board appointed a panel to arbitrate the dispute.

EDUCATION

Enrollment in the public schools continued to increase, totaling for 1942-43 321,568, or 9,232 more than in the previous year. The language problem was given serious attention. Experts from the continental United States were brought to the island to study the effect of teaching in two languages.

The University of Puerto Rico underwent a major change. Under the new University Law, which became effective during the year, the old Board of Trustees was superseded by a Superior Council of Education. A new Chancellor was appointed and he immediately instituted basic reforms, the efficacy of which remain to be determined.

HEALTH

The Department of Health reports an increase in the birth rate for 1942 of 1.2 percent over the previous year. The death rate was 16.6 percent as compared with 18.4 percent the previous year. The leading causes of death were: (1) diarrhea and enteritis; (2) tuberculosis; (3) pneumonia and heart disease.

Strenuous efforts were continued to combat venereal disease. Two special hospitals for the treatment of venereal disease were opened,

and plans were made for several more. Malaria control work was also pushed.

DEPARTMENT OF AGRICULTURE

War-time conditions produced special problems in the field of agriculture. The securing of seed and fertilizer was very difficult. This situation eased toward the end of the year, however.

One serious problem, which remains unsolved, is the disposal of molasses. Because no tankers were available, none of the 1943 production was moved from the island.

The Insular Department of Agriculture inaugurated an extensive seed-production program, under an agreement with the Federal Department of the Interior. This program, together with the price-support program of the Food Distribution Administration, has already increased local food crop production and is expected to step it up even further.

PLANNING BOARD

The Puerto Rico Planning, Urbanizing, and Zoning Board began work in 1942. Cooperating with the emergency program, the planning board classified and reviewed all work-relief projects of the program.

As part of its regular activities, the planning board held public hearings on its master plan of major thoroughfares in the San Juan metropolitan area. It made various studies, including a special investigation of conditions on the island of Vieques, which has been seriously affected by war conditions.

LAND AUTHORITY

During the year, the Land Authority acquired 16,101 acres of land in 30 different municipalities at a total value of \$2,051,801.08, an average of \$125.21 per acre. A total of 4,212 families (about 22,000 people) have received parcels of one-fourth to one cuerda each. Six proportional-profit farms, comprising 5,371 cuerdas, are being operated on land bought from Central Cambalache.

WATER RESOURCES AUTHORITY

It seemed necessary under war conditions to unify all sources of power in the island. As a result of condemnation proceedings under the Lanham Act, the properties of the Porto Rico Railway Light & Power Co. and the Mayaguez Light, Power & Ice Co. were delivered to the Federal Works Administrator, who entered into a contract with the Water Resources Authority to operate them. Suits to determine the final disposition of the properties are still pending.

The Garzas plants, which had been operating from low-stage reservoir storage since November 1941, became full-stage producers. Dos Bocas, which was 98 percent completed at the end of the previous fiscal year, came into production.

TRANSPORTATION AUTHORITY

The Puerto Rico Transportation Authority acquired the White Star Bus Line, serving the metropolitan area of San Juan, in November 1942. When the Authority took over, not more than 40 of the 229 busses belonging to the company were fit for service. Lack of repair parts and tires presented special difficulties. By March, however, the Authority had 65 busses moving. Sixty more will be put into service upon arrival of new motors which have been ordered with War Production Board approval.

DEVELOPMENT COMPANY

The Puerto Rico Development Co., established for the purpose of stimulating the growth of industries, made substantial progress. A glass factory to produce bottles is now under construction, and is expected to begin operation before the end of 1943. Plans are being studied for the construction of a wallboard factory which would utilize bagasse, a waste product of sugarcane. The possibility of establishing a textile factory, a paper mill and a yeast plant are also being studied.

The company has contracted with local manufacturers for the production of bamboo furniture from designs furnished by the company. It has made a similar contract for the manufacture of white ware and pottery. These products are already being successfully sold on the local market.

VIRGIN ISLANDS

The war has been the dominating factor in Virgin Islands economy, and its effects have been demonstrated in all phases of community life. Although the danger of attack by air or surface raider became more remote after the occupation of North Africa by the United Nations, the program of civilian defense initiated with success in the preceding fiscal year was prosecuted with vigor. Fire defenses were improved, raid drills and blackouts were carried out, home guards were trained intensively and the American Red Cross extended its facilities and activities supported by financially successful campaigns. During the past year the armed forces have been a large element in the life of the communities in the Virgin Islands.

As the Virgin Islands were early to feel the economic uplift of the war, so they are among the first American communities to experience the inevitable retrogression. During the year under review, defense construction operations gave employment on the island of St. Thomas to every employable male worker, and the shortage of native labor to meet the abnormal demand resulted in heavy importations of labor from neighboring British islands. With the reduction of defense construction, as the year grew to a close, a great many of the imported aliens were repatriated.

However, unemployment undoubtedly will be the most serious consideration in the Virgin Islands in the immediate future. Projects for water storage in St. Croix, for the extension of water supply facilities in St. Thomas, and the construction of highways in both islands, commenced in earlier periods, must be prosecuted vigorously to relieve unemployment as well as to provide basic improvements in the communities. These projects can be expanded without detriment to the larger interests of the national war effort because critical material is not involved. Projects for construction of new hospitals, extension of sewerage systems, sanitation facilities and many other projects of like nature, which are absolutely essential to the health and general welfare of the people of the islands must, of necessity, be deferred.

The attention of the administration has been largely directed to the connected problems of food and shipping. Early in the year, the Department of the Interior, through its special defense appropriation, established civilian food reserves to insure that basic food commodities would be available to the people of the islands in spite of disruption of commercial trade and shipping facilities. The Food Distribution Administration of the Department of Agriculture now acts as the agent of the Department of the Interior in the purchase of foods requisitioned by that Department and in their distribution through sale to the merchants in the islands. Steamship space for shipment of both food and general supplies required in the islands is made available by the Department of the Interior in vessels assigned by the War Shipping Administration. These supply agencies function successfully with the result that a sufficient supply of foodstuffs is available.

On the island of St. Croix, the Work Projects Administration developed an extensive project of vegetable production for the public institutions. On the island of St. Thomas, municipal appropriations were used to provide a direct labor subsidy to encourage an increase in the production of vegetables and other locally grown products. The problems of price adjustment and rationing were met by the

Office of Price Administration which extended its activities to the islands.

The abattoir on the island of St. Croix, constructed in a prior period from Federal funds, furnished dressed meat to the new Cold Storage Market in St. Thomas, likewise constructed from Federal appropriation. The profitable operation of the abattoir on a commercial basis appears to be doubtful because of its size and the unavailability of sufficient livestock. The Cold Storage Market at St. Thomas, on the other hand, gives hope of profitable operation and will be an increasingly important factor in the life of the community here by providing refrigerating facilities.

The Federal Works Agency, which late in the preceding fiscal year acquired a 1-year leasehold of the docks of The West Indian Co., Ltd., at St. Thomas, and acquired title in fee simple to its electric light and power station, operated these public utilities until March 1943. After the end of one year's operation it returned all of the properties to the former owner, The West Indian Co., Ltd.

The increase in income taxes on general business as well as the increased rates and lower exemptions yielded income taxes of \$465,000 in the municipality of St. Thomas and St. John as compared with \$316,000 in the preceding year, an increase of 47 percent. The municipality's total revenues for the year totaled \$693,000 as compared with \$599,000 in the preceding year.

In the municipality of St. Croix, total income tax collections were \$46,900 as compared with \$30,000 in the preceding year, an increase of 55 percent. The total revenues of the municipality of St. Croix were \$194,000 as compared with \$196,000 in the preceding year.

The municipality of St. Thomas and St. John not only operated without a Federal deficit appropriation for the second successive year but, by June 30, 1943, the Treasury of this municipality had collected a surplus of approximately \$80,000 in revenue over budgeted obligations. The municipality of St. Croix operated with a Federal deficit appropriation of \$114,800 which was supplemented by a deficiency appropriation of \$45,000.

There has been little improvement in hospitalization and sanitation conditions in the islands. All medical institutions of the islands continue to be in dire need of rehabilitation and modernization of equipment. The disgraceful system of nightsoil disposal continues to be a most serious menace to the health of the civilian population as well as of the armed forces. The open gutters and sewers in all towns are shockingly offensive. Unfortunately, the correction of most of these conditions must be deferred.

THE PHILIPPINE ISLANDS

The Philippines continued to suffer the effects of enemy invasion. The proclamation of occupation issued on January 3, 1942, Manila time, was followed by the internment of citizens of the United States, Great Britain, and the Dominions, the Netherlands, and most of the Latin-American republics and by the seizure of their property. Philippine citizens and Chinese were allowed comparative freedom of residence, and Japanese were accorded civil rights equal to those of Filipinos.

On January 23, Jorge B. Vargas and some 30 other members of the pre-war cabinet, courts, and legislature, together with prominent Filipino citizens were authorized to form a provisional council of state, and an Executive Commission. The Executive Commission set up a central government under the chairmanship of Mr. Vargas. A considerable number of former bureau chiefs and other governmental personnel appear to have joined the collaborationist movement, undoubtedly in many instances under circumstances of heavy duress.

Intercepted broadcasts revealed that guerrilla warfare was being waged in all the larger islands and that the mass population continued in its loyalty to the United States and to the Commonwealth Government-in-Exile. Japanese and collaborationist efforts to control the economic and social life appear to have met with indifferent success. In May 1943 the Japanese government promised to grant the Philippines "independence within the Greater East Asia Sphere" before the end of the year. In preparation for this step a preparatory committee was nominated. At the same time the liberty of the people was carefully restricted through the organization of neighborhood and district associations under petty native tyrants of Japanese affiliation. All liberal elements were subjected to control and persecution, and efforts were made to crush opposition to the proposed "independence."

The Commonwealth Government-in-Exile under the leadership of President Quezon and Vice President Osmena continued to function in Washington. In line with assurances given in January 1942 from Corregidor, all current financial obligations including interest on the public debt were acquitted. The currency reserve funds on deposit in the United States were kept intact at more than 100 percent of immediate pre-war circulation.

The functions and duties of the High Commissioner to the Philippine Islands were transferred to the Secretary of the Interior by Executive Order No. 9245, September 16, 1942. President Roosevelt accompanied the order with a letter to the Secretary reading as follows:

MY DEAR MR. SECRETARY :

Having decided that under existing conditions Philippine matters can best be administered by a member of the Cabinet in close consultation with me, and that for the present the appointment of a new High Commissioner is inadvisable, I have today signed an Executive order transferring to you for the time being the functions, powers, and duties of the United States High Commissioner to the Philippine Islands, together with the personnel, records, property and funds of the said office.

While the work of the High Commissioner's office has been materially changed in character as a result of military action and the occupation of the Philippines by Japanese forces, we must be ready to deal with the many new problems that will confront us when the enemy is ousted from Philippine soil and final victory is achieved by our forces with the aid of the gallant Philippine people. It may be expected, for example, that transportation will be disrupted, food supply lacking, the money and banking system disorganized, and in many places civil government broken down. Foreign and domestic trade will have to be revived. American and other outside investments in the islands will present complex problems. In short, our duties and responsibilities in the Philippines will be multiplied by enemy invasion and will increase with every month of occupation.

It will be your duty to undertake the conduct of such studies and investigations as may be necessary to enable us to deal with these problems when the time arrives, and to submit recommendations or take such action as may appear necessary as a result of your inquiries. In particular, there should be an immediate inquiry into the financial problems which have ensued as a result of Japanese occupation.

In the conduct of your studies and investigations you will consult with the President of the Philippines and other officials of the Philippine government to the extent that you find it necessary or advisable. You may also call upon other agencies of this Government for advice and assistance.

Under the terms of the foregoing letter, the Office of the High Commissioner was reorganized with a considerable reduction in personnel and assigned the duty of preparing in consultation with Commonwealth officials a generous and effective program for the economic and financial rehabilitation of the Philippines. It is anticipated that upon the defeat of enemy forces much of the physical property of the government will have been destroyed or damaged, the provincial and municipal treasuries will be empty, banks and credit institutions insolvent, the basis of public tax and revenue impaired for several years, and the schools and health service abandoned. The sympathetic and effective assistance of the United States will be required to reestablish the normal political, economic, and social life of the Philippine Commonwealth.

Puerto Rico Reconstruction Administration

BENJAMIN W. THORON, Administrator ¹

THE principal contribution of the Puerto Rico Reconstruction Administration to the war program during the year has been the planting of more than 15,000 acres of lands owned by the Government in food crops. Vegetable marketing cooperatives which were financed and supervised by the PRRA, supplied fresh produce to the armed forces in the island in ever increasing amounts in addition to providing much needed subsistence for the inhabitants of the island. A cotton cooperative has provided substantial quantities of Sea Island cotton required for war purposes. The butyl alcohol plant of the Lafayette Sugar Mill Cooperative has exported more than three and a half million pounds of solvents to the States for the exclusive use of concerns having direct or indirect war contracts. In general, the funds available have required limitation of PRRA activities to the preservation of the social and economic progress achieved and to the protection of investments of the Government, which are valued at approximately \$20,000,000, and were produced by programs of previous years.

FUNDS AVAILABLE

For such purposes the President authorized expenditures by the PRRA during the fiscal year 1943 out of the Puerto Rico Revolving Fund (49 Stat. 1135) on the following projects:

Operation and maintenance of housing projects and facilities-----	\$165,000.00
Management of lands and leases connected with Lafayette project---	87,000.00
Operation of Castaner farm project-----	50,000.00
Supervision of and making and servicing of loans to cooperatives---	250,000.00
General administration-----	109,180.00

¹ By Executive Order No. 8278 of December 4, 1942, Benjamin W. Thoron, Director of the Division of Territories and Island Possessions, was appointed Administrator to serve without additional compensation vice Guy J. Swope, resigned. Guillermo Esteves as Assistant Administrator was continued in active charge of the work in Puerto Rico.

1942 unobligated balance Eleanor Roosevelt Development.....	\$18, 412. 76
Construction of approximately 600 farmers' houses.....	400, 000. 00
Operation Central Service Farms.....	89, 200. 00
To complete certain land purchases.....	5, 000. 00
Subdivision and sale of 900 acres Lafayette grazing lands.....	4, 600. 00
Total.....	1, 178, 392. 76

Adjustments in the amounts of the respective project authorizations were later approved by the President to meet requirements of the overtime pay acts, without changing, however, the aggregate amount of available funds. In addition to the Federal funds, the legislature of Puerto Rico appropriated \$50,000 to the PRRA to assist in the operation of its Central Service Farms.

A summary of the year's principal activities follows:

HOUSING MANAGEMENT

In addition to 1,210 family dwelling units in its 5 low-cost urban housing projects, PRRA has 5,783 rural houses on small subsistence tracts, and 5,326 3-acre parcels without houses which are leased for cultivation to farm laborers at nominal rentals. Most of the rural houses are of concrete construction and termite and hurricane proof; some are brick and concrete; some galvanized iron and some principally of rammed earth. About 200 of the latter type of block houses were constructed during the year. Difficulties in procuring delivery of noncritical materials prevented construction of the 600 contemplated, but the remainder will be built during the fiscal year 1944 out of the unobligated balance in the project which the President has continued in availability for that purpose. Construction during the fiscal year 1943 included completion of 159 units for national defense workers at the Eleanor Roosevelt urban development. As of June 30, 1943, occupancy of urban projects was 100 percent; occupancy of 99.08 percent in 7 rural resettlement areas and 96.11 percent in the remaining scattered rural units. Total rental collections amounted to \$301,600, leaving a substantial net return over and above management, repairs, and other expenses totaling approximately \$180,000.

LOANS TO COOPERATIVES

Supervision, organization and financing of cooperatives has been continued, with particular attention to stimulating activities of the vegetable and cotton cooperatives and to increased production of the butyl alcohol plant previously mentioned. Production of sugar by the Los Canos and Lafayette Sugar Mill Cooperatives will probably

fall 17 percent below the previous year's processing due to lesser cane production attributed principally to shortage of necessary supplies and facilities. Pending regulations of the Public Service Commission of Puerto Rico have also increased obligations by mills to growers for cane transportation charges. Despite other difficulties incident to war conditions, the Los Canos Cooperative promptly met at maturity the installments due June 30 on its loans from the Government, but at this writing the Lafayette Mill has not completed similar arrangements. The Sociedad Agricola which purchases farm supplies for over 3,700 members and patrons sold fertilizer, insecticides, animal feeds, seeds, and other farm supplies amounting to over \$350,000. This cooperative under new management is expected to become an important factor in meeting farmers' needs at reasonable prices. The Vanilla Cooperative has been particularly valuable to growers in the Coffee District by curing and marketing at a favorable price more than 3,275 pounds of vanilla beans.

RURAL REHABILITATION

Operation of the Central Service Farms project with \$89,200 out of the revolving fund and \$50,000 appropriated by the insular legislature, made it possible for PRRA to plant 500 acres in seed beds of subsistence crops. PRRA furnished the land, working animals, machinery, agricultural implements, warehouse and other facilities, and the Work Projects Administration furnished technical direction, laborers, fertilizer, and insecticides. Of the total seed production 10 percent was turned over to PRRA for its planting program, and the balance was used by WPA both for planting and for its school lunch program. In its planting program, PRRA accomplished the planting of approximately 15,000 acres in food crops and 3,000 acres in cash crops in the various small subsistence farms occupied by its resettlers. Thirty-four rural waterworks were operated, furnishing potable water to more than 100,000 persons. Seventeen community centers were operated for the benefit of PRRA resettlers, small farmers and laborers of the surrounding districts. Technical advice and help was given to resettlers to encourage maximum production of foodstuffs. Insular authorities have evidenced their appreciation of the value of PRRA's rural rehabilitation program by a legislative appropriation of \$60,000 and by an allotment of \$212,790 to the PRRA for its planting program from the Insular Emergency Council for the fiscal year 1944.

In the Castaner project 1,200 acres were cultivated in coffee, sugarcane, citron, vanilla and various subsistence crops. The sale of agri-

cultural products brought in more than \$60,000, more than \$10,000 in excess of the amount allotted for operation. Some 200 resettlers' families on 1-acre subsistence plots were provided with work. At Castaner the Director of Selective Service established a Civilian Public Service Camp for emergency medical aid and health education under the direction of the National Service Board for Religious Objectors, with technical supervision of the planning and direction of the work program by the PRRA. The 25-bed hospital which the board established is making a fine contribution to the welfare of PRRA resettlers and their neighbors in both preventive and curative health treatment.

CONCLUSION

For continuation of projects similar to those herein reported, the President has authorized the PRRA to expend \$801,000 in new allotments and unobligated balances of approximately \$250,000 more out of the revolving fund during the fiscal year 1944. This, like authorizations for the fiscal year 1943, will be barely sufficient to protect temporarily the large investments of the Government produced by previous PRRA programs, and to conserve some of the social and economic progress which would be completely lost if the program was entirely terminated. However, if like expenditures should be made in succeeding years, it would not be long before the revolving fund was exhausted. Before that time comes, consideration will be in order as to whether the PRRA should be liquidated or whether other financing should be provided for continuation of the most essential activities in which it has been engaged. In view of the ever-present problem of the island's distressed economy, and the questionable benefit of mere palliative relief expenditures, PRRA's experience has probably demonstrated the advisability of devoting emergency funds, whether Federal or insular, to projects with long-range reconstruction possibilities.

General Land Office

FRED W. JOHNSON, Commissioner

THE mobilization of millions of acres of public lands whose natural resources today furnish vital weapons for the fighting machine of the United Nations and tomorrow will constitute an important segment in the economic life of the United States after peace has been won, was the major objective attained by the General Land Office during the 1943 fiscal year. Under its supervision, tracts of the public domain with a total acreage equalling that of several States, were made available for troop training, aerial bombing and gunnery practice and other military purposes, and more than 70,800,000 additional acres were withdrawn to insure the development and production of strategic war minerals. Still more acres furnished petroleum and other mineral products for military use under the system of public domain leases maintained by the Office.

Valuable timber supplies were provided from 2,500,000 acres of forest lands under General Land Office administration in western Oregon, and the meat ration of combat troops and civilians was augmented by the livestock raising operations and range development work upon grazing sections of the public domain under its jurisdiction.

At the same time, the organization, geared to meet wartime demands for efficiency, carried forward important though less spectacular operations involving the public domain, originally entrusted to it by Congress in 1812. In this field, the identification, recordation, and administration of the public lands in accordance with more than 5,000 public land laws, are performed by the Office as the official real estate agent of the Federal Government.

Despite the increasing volume of these routine duties, many of which were undertaken at the request of other governmental agencies and for their benefit, and despite the added work-load of war-connected activities, the General Land Office during 1943 maintained its position as one of the few executive agencies which operates at a profit to the Federal Treasury. Cash receipts from its activities

totaled \$9,758,066, as against expenditures of \$2,304,416. This ratio of a return of approximately \$4.25 for each \$1 of expenditures, moreover, was achieved in spite of the added costs involved in the establishment and operation of a Branch of Field Examination in the General Land Office, and without taking account of activities which produced no cash return, such as surveying and other tasks performed as utility services for other government agencies and the public. Incidentally, the total cash receipts were the greatest since 1926, and represented the second consecutive year in which the aggregate volume reached more than \$9,000,000.

HISTORIC LAND USE POLICY

The use of the public lands as an auxiliary weapon in time of war and a potent factor in national development in time of peace, conforms to a traditional policy of the United States as old as the Republic itself. After the Revolutionary War, cash sales of such lands helped meet the cost of that war and large tracts were utilized as a bounty payment for military service, in parcels ranging from 100 acres to private soldiers to 1,100 acres for major generals. Generally speaking, similar provisions were made for recognition of military services after the War of 1812, the War with Mexico, and the Indian Wars. Altogether, approximately 61,000,000 acres of the public domain were devoted to the satisfaction of claims based upon military service in these wars.

Although the enactment of the first homestead law in 1862 terminated the era of military land bounty payments, the public domain retained its significance in connection with the Nation's military efforts. Certain settlement preference rights on public lands were extended to ex-servicemen after the Civil War, and that policy consistently has been followed through each subsequent conflict, including the First World War.

Fortified by almost a decade of national conservation, during which the natural resources on the public lands were protected from wasteful dissipation, the United States at the outbreak of the present global war found itself able to contribute more from its public domain treasure houses than ever before in history. While working still within the conservation framework to insure every possible safeguard against misuse of elements needed for the welfare of future generations, the public domain again has been mustered into active service.

As was to be expected, the most immediate contribution from the public domain was in the form of land areas for training soldiers and for the other many uses in modern warfare. Under a program which

was begun before the United States entered the war, more than 15,270,000 acres had been set aside for combat training and other military use at the close of the fiscal year. Including many tracts whose scope and identity still are closely guarded military secrets, a total of 4,703,762 acres were withdrawn for military purposes during the 1943 fiscal year.

In addition, smaller portions of the public domain were made available as sites for defense plants, and to provide housing facilities for war workers. In the latter category, these projects located on public lands in Nevada, California, and New Mexico, made available more than 1,000 units of essential dwelling, dormitory, or trailer housing accommodations.

Studies relating to the post-war administration of these areas and of lands acquired by the Federal Government by purchase, exchange, or other negotiations, for war purposes, were set under way by the General Land Office during the year.

MINERALS MAKE MILITARY MIGHT

Furnishing an increasing and continuous flow of mineral resources from the public domain into the fuel tanks, the ammunition boxes, and the arsenals of the United States was another task confronting the General Land Office during the 1943 fiscal year. Extending beyond the present conflict, its activities embraced steps for self-sufficiency in supplies of the vital mineral products during the Nation's reconstruction period.

An increase by about one-third in the amount of gasoline and butane produced under leases on the public domain was recorded during the year, while the production of oil also was greater than the previous year.

The total cash returns to the United States in 1943 from the Mineral Leasing Act were the highest in 17 years and receipts from all mineral leasing operations reached \$7,790,473, an increase of \$397,427 over last year.

Besides these direct contributions from the public domain, more than 70,800,000 acres were withdrawn for various war uses in connection with the development of strategic minerals, and 43,000 acres were provided under special licenses to defense plants for the extraction of strategic minerals.

As a further aid to the procurement of necessary mineral supplies, plans were formulated and embodied in an order issued by Secretary Ickes on June 9, 1943, for the wider development of potash deposits in the United States. Designed to meet the current and future needs for potash and its associated compounds, previous restrictions upon the

issuance of potash leases were removed to permit the decentralization of sources of potash through production in different areas. The order also facilitates the maintenance of competitive enterprise in the potash industry, and the utilization of this natural resource along safe conservation principles.

O. & C. LANDS FURNISH TIMBER

War demands for specialized types of forest products ranging from heavy timber for piling and shipyard construction to wood for airplane building were partially met in 1943 from the 2,500,000 acres of public domain in the Pacific Northwest which comprise the Oregon and California revested railroad grant lands under the jurisdiction of the General Land Office. Timber sales from these areas, including tracts of Oregon and California lands within national forest boundaries, totaled 485,029,000 board feet, valued at \$1,915,964.

One of the world's largest testing grounds for scientific forestry methods, the Oregon and California lands are administered under policies of sustained-yield management which insure, through reforestation and limitations on timber cutting, a continuous supply of timber for the support of the lumbering communities and industry of the region. At the same time, the program calls for payments of a large part of the proceeds from the timber sales to the 18 Oregon counties in which the Oregon and California lands are located. Under this arrangement, approximately \$976,000 will be paid to these counties from the returns on 1943 sales. Part of this payment constituted final liquidation of a \$2,000,000 debt of back payments owed the counties under earlier legislation involving the O. & C. railroad grant. Original estimates called for the liquidation of this debt over a 10-year period, but so successful have been the financial operations under the O. & C. Revested Lands Administration, that it was wiped out in 1943—4 years ahead of schedule. The amount formerly paid to the counties as back taxes now will be used to liquidate Federal Treasury demands upon the O. & C. lands; eventually, the Oregon counties will receive 75 percent of the proceeds from timber sales in the O. & C. area. Costs of administering these lands continue to be less than 25 percent of gross receipts.

LAND FOR LIVESTOCK

Contributing its share to the supply of food, fiber, and leather for fighting men and civilians, the public domain during 1943 afforded opportunity for the grazing of livestock upon 11,984,939 acres of land outside Federal grazing districts in continental United States and Alaska. These operations carried on under the jurisdiction of the

General Land Office involved 10,151 leases of lands for grazing purposes requiring an annual rental of \$216,485. Of the total, 1,168,954 acres of the leased public domain areas were in Alaska—some in regions now affected by military operations—the remaining 10,815,985 acres being within the continental limits of the United States.

The solution of problems of improvement and maintenance of the range in order that maximum production may be secured for war purposes, also was included within the scope of public domain administration during the 1943 fiscal year. For example, on the Oregon and California Revested Lands, where timber cutting is the primary concern, special effort was made to lease all areas adaptable for grazing use.

Although handicapped by a shortage of manpower and wartime priority restrictions on materials, the Range Development Service of the General Land Office continued work on 139 projects in 10 Western States, involving range improvements, fence construction, development of springs, wells and other stock-watering facilities, and soil and moisture conservation on the public lands. Working in cooperation with the stockmen, the States and counties, and with other Federal agencies, the Service program last year brought substantial benefit to 1,736,917 acres of land. A "work-shelf" of projects which provides for wider development of watering facilities, the reseeding of forage acres, and rodent control work, was planned during the past year and will be begun by the Range Development Service on the public domain as soon as the labor and material supply situation will permit.

LAND CLASSIFICATION AND RESEARCH

One of the features of the national conservation policy which contributed substantially to the accumulation of natural resources available at the outbreak of the war was the stipulation that no disposal would be made of tracts of the public domain until after they had been classified as to the best use to which they could be put. Thus, the identification, classification, and examination of the portions of the public lands which enter into the Nation's military or economic structure forms an important element in General Land Office activities. Although lacking the spectacular aspects of other forms of war work, these activities nonetheless are equally essential to public land administration in war or peace.

Working in close cooperation with the Congress in the study of public land administration problems, we frequently placed the research and statistical facilities of the General Land Office at the service of the Senate and House during the year. Tabulations and textual information were prepared and submitted at the direct request of committees

dealing with public land matters. Included in this material were an inventory of all public lands in Federal ownership in 13 Western States and a detailed report on public land withdrawals which was compiled for the Senate Committee on Public Lands and Surveys.

In addition to its analytical operations, carried on in response to demands from the Congress, the Office rendered expert assistance to other governmental agencies in their consideration of many land management aspects of their work. This form of collaboration was particularly prominent during the year in Alaska, where several bureaus of the Department of the Interior, including the National Park Service, undertook a joint study of administrative problems growing out of the completion of the Alaska Highway.

More specifically, land classification work closely related to the war included assistance to military agencies in connection with land acquisitions and the making and adjustment of withdrawals of public lands for military uses and for air navigation sites both in the United States and Alaska.

Statistical research and analytical studies of paramount importance in evaluating military and post-war problems and their solution were made by the General Land Office during the year. Among these were special tabulations on lands withdrawn for military purposes for the War and Justice Departments, and studies designed to determine the probable food production on the public domain and ways of increasing it in furtherance of the national food-for-war program.

Moreover, methods for carrying resource protection through the war and into the reconstruction period constituted a major task confronting the research and classification branches of the Office. With the trend of national legislation placing particular emphasis upon scientific administration of the public domain, this work, involving such features as townsite and land use planning, and other technical studies, is expected to play a role of ever-increasing importance in the solution of post-war problems.

CADASTRAL ENGINEERING SERVICE

Because no tract of land properly may be set aside for any purpose until its location and boundaries have been accurately determined and permanently recorded, the Government's cadastral surveys have been the basic foundation in negotiations for the disposal, exchange, withdrawal, or other change in the status of the public domain areas since 1796. Differing from the type of survey work which involves primarily the recording of geologic, geographic, or historic features of the terrain, cadastral surveying consists of careful measurement of land areas on the ground, and the recording of such measurements

by the placing of monuments, or other markers, and the preparation of maps scientifically compiled from field notes made by trained engineers at the time of the on-the-ground measurements. First undertaken by the General Land Office when the system of public land surveys decreed by the Continental Congress was transferred to its jurisdiction in 1812, maintenance of a cadastral engineering service has been a continuing responsibility of this Office.

During the 1943 fiscal year, 14 separate agencies of the Federal Government called upon the Service for accurate field surveys of land areas under their jurisdiction, and a total of 2,026,119 acres was covered in the annual work schedules, in addition to many other projects of survey not measurable on a quantitative basis. Surveys conducted at the request of the Army and Navy, the Defense Plant Corporation, Civil Aeronautics Administration and other war-connected agencies resulted in acceleration of the war program. Development of production of potash and sodium in California, magnesium in Nevada, coal in Utah and Wyoming, and timber in Oregon was facilitated by the work of the Service during the year, and housing facilities were made possible for defense workers through townsite surveys in California.

Substantial aid in protecting the public domain from fire losses is afforded by these cadastral engineering activities, because standardized Federal rectangular survey designations enable speedier and more accurate identification and location of threatened areas than metes and bounds measurements.

BRANCH OF FIELD EXAMINATION

The rendering of technical assistance to many agencies of the Government in the solution of their land administration problems brought a heavy 1943 workload to the Branch of Field Examination. This branch completed its first fiscal year as an agency of the General Land Office, following its reorganization by order of the Secretary from its previous status as a departmental division.

Maintaining regional offices in San Francisco; Billings, Mont.; Salt Lake City, Utah; and Albuquerque, N. Mex., with an office at Anchorage, Alaska, the organization includes engineers, geologists, timber and range specialists, experts in land laws and regulations, and other types of experienced personnel.

The war materially affected the field work, and in some regions approximately 50 percent of the problems were of a military nature, and also involved observance of the land laws. Much of this work consisted of investigating the validity of mining claims on sites selected by the Army or Navy for military purposes, and securing the can-

cellation of invalid claims, thus saving the expenditure of funds which otherwise would have been spent in purchasing such lands. In one region these investigations involved a total of more than 4,000 mining claims.

ALASKA

The problem of Alaskan development presents both an immeasurable opportunity for the advancement of civilization along the Nation's only remaining pioneer frontier and a challenge to use of the highest possible standards of public land administration in such development. Because the Territory's total area consists almost in its entirety of public domain, the General Land Office occupies a position of direct responsibility for the proper solution of this problem.

First undertaking that responsibility more than a half century ago with the establishment of the first office in Sitka in 1885, today District Land Offices are maintained in Anchorage, Fairbanks, and Nome, while the District Cadastral Engineer for Alaska is stationed at Juneau. In addition, the headquarters of the Alaskan Fire Control Service and an office of the Branch of Field Examination are located at Anchorage.

Some idea of the problem presented in the Territory may be gained from the fact that the total land area of Alaska, as recomputed for the 1940 Decennial Census is 571,065 square miles or 365,481,600 acres. Of this total, 2,321,304 acres have been surveyed, leaving an unsurveyed area of 363,160,296 acres. The surveyed area represents only 0.6 per cent of the total land area.

Based on the latest computation, the area of vacant, unappropriated and unreserved public domain in Alaska is about 225,000,000 acres. In addition 6,940,698 acres are embraced in national park and monument areas and 20,849,187 acres in national forests. Of the remaining 112,691,715 acres, only a very small portion is in private ownership. The rest is embraced in other forms of public reservations.

ALASKAN SERVICE FIRE CONTROL

The wider development of Alaska will of necessity carry with it broadened responsibilities for fire protection and suppression on the far-flung areas of the public domain in the Territory. This task already has been undertaken by the Alaskan Fire Control Service of the General Land Office, although under financial handicaps greater than those imposed on any similar organization in the entire Government service, considering the fire problem involved.

The magnitude of the protection problem confronting the Service can better be realized by stating that the area under its supervision equals the combined area of the States north of the Mason-Dixon Line

and the Ohio River and east of the Mississippi, and is about 60 percent larger than all the Federal holdings in the national forests of the continental United States. It consists of approximately 40,000,000 acres of fairly dense forests of spruce and birch, 110,000,000 acres of open woodland and interspersed grasslands, and 100,000,000 acres of tundra vegetation in the extreme north and northwest sections of the Territory.

Despite the handicaps of restricted funds and manpower shortage, however, the Alaskan Fire Control Service was able to furnish creditable protective service during the 1943 fiscal year. Substantial cooperation in fire fighting was rendered by the Alaskan command of the U. S. Army.

The reduction in loss of natural resources is of tremendous importance to Alaskans as well as to the Nation as a whole. Besides the saving of valuable timber stands, decrease in burned acreage means less game and wildlife habitat destroyed with consequent less mortality of the wildlife and lessened migration from district to district within the Territory. This is particularly important because during these times of high living costs, sharply reduced transportation facilities, etc., the natives in the more remote sections of the Territory have become even more dependent upon wildlife for their food supply.

ALASKAN SETTLEMENT PROBLEMS

Interest in economic possibilities in Alaska has been increasing for a number of years, and a post-war acceleration of demand for land in the Territory seems inevitable. Not only will members of the armed forces and civilian construction workers become acquainted with the advantages of the Territory, but new road construction, including the international highway, has made Alaska more accessible.

One of the prime requisites for proper development in Alaska is a thorough understanding of the types of public land available for use and the maintenance of a system which will capably and adequately insure the fullest possible utilization of that understanding for the benefit of the Territory as well as for the benefit of the individual settler. Such a system is contemplated under plans which were perfected by the General Land Office during the year for the classification of the public lands in Alaska, and which can be put into operation at the will of Congress.

Classification of the individual tracts of the public lands sought in Alaska will be a significant contributory factor in their successful settlement. Notwithstanding the extent and variety of these lands and the wide opportunity for development, the amount of land in Alaska suitable for present intensive development is not large when

compared with the area of the Territory. Popular concepts of settlement possibilities in Alaska all too often are predicated on inadequate knowledge of widely varying physical characteristics and the sharp and critical climatic differences which exist, and fail to take into account the problem of adequate community services. Thus, classification would help insure the procurement by prospective settlers of lands suited to their needs and guard against entry and selection for inappropriate uses.

Recognizing that this problem would be of immediate concern in connection with portions of the public domain adjacent to the new Alaska Highway, the General Land Office during the year began a series of special studies and field investigations by land classification experts to secure the most efficacious use of the tracts in the post-war period.

POST-WAR PROBLEMS

The mobilization of landpower, like the mustering-in of manpower, brought with it definite problems of administration for solution when peace will have been restored. Many of these questions, obviously, have not yet reached the point of crystallization. However, their potentiality as factors in the post-war public land pattern was given recognition and consideration by the General Land Office consistent with the demands of its current tasks during the year.

Foremost among the subjects requiring careful consideration is that of post-war disposal or administration of lands which have been allocated to military uses. Many millions of acres of public lands withdrawn for military purposes are subject to restoration to the public domain within six months after the end of the war. The fitting of these areas into the peace-time land pattern of the Nation entails problems of administration which the General Land Office is laying plans to meet.

RECOMMENDATIONS

The fighting of a war on the home front, no less than in the battle areas, often reveals inadequate technical procedure or equipment whose replacement or augmentation would be of material aid in both military and post-combat operations. Such a situation frankly exists with respect to some features of public land administration. With a view to assisting in bringing about the desired improved conditions, the following recommendations are made by the General Land Office, based upon its experience in land administration:

1. Developments in the field of mineral resources point to the desirability of revisions in old mining statutes which, while stimulating private enterprise and effort, will safeguard and strengthen the

public interest by providing for economical and efficient operation and the elimination of wasteful practice through effective administration. Mining activities on the public domain, in an effort to meet the war demands for critical and strategic minerals, have served to emphasize the need for the revisions pointed out in last year's report.

Among these revisions would be the enactment of a unified leasing system applying to all minerals not now subject to leasing both in the public domain and in other lands acquired by the Federal Government. These deposits are the property of all the people and should, under proper administrative authority, be made to serve the public weal, rather than be susceptible to wasteful exploitation, as has been possible under conditions as they now exist.

Moreover, new interest in the possibilities of producing strategic and other minerals from public-domain lands has arisen because of the requirements of the war and threats of post-war shortages. Some procedure should be made available, therefore, under which the Government would be enabled to assist private industry in conducting additional exploratory work for minerals on public-domain lands to alleviate these shortages and retrieve any gains from the discovery for the benefit of the public as a whole. Such a procedure would make it economically feasible to carry on much exploratory work not otherwise possible.

2. The increased demands for natural resources to meet military and post-war needs makes complete knowledge and understanding of the character and status of the public lands imperative factors in their proper development and efficient administration. The fact that at the present time evidence of the filing of thousands of unpatented mining claims is not made a matter of Federal record is a serious obstacle to such understanding. The enactment of legislation to enable the filing of such evidence in the General Land Office is urgently recommended.

3. At the present time there is no means available by which accurate, detailed information can be secured concerning the real estate holdings of the various branches of the Federal Government. The establishment within the General Land Office of a centralized, consolidated inventory of all such land records, as a logical supplement to data already in its custody, is recommended as a solution of this problem.

4. Legislative authority for the extension of the protection afforded by land classification to settlement activities in Alaska is of urgent concern. This need is particularly emphasized because of the Alaska highway and other developments which have increased the accessibility and desirability of the Territory to prospective settlers.

5. With world conditions imposing heavy burdens upon our stock of natural resources, fire protection on public-domain lands under the jurisdiction of the General Land Office, both in Alaska and in the continental United States, demands special consideration through the strengthening of present authority and organizational facilities.

6. Greater protection for the public lands and resources and greater efficiency in their administration would be brought about through the enactment of a uniform Federal trespass law.

7. Another year of operation under war conditions has only served to strengthen the need for a careful study, and restatement at the first opportunity, of the multifarious public-land laws under which military and peacetime administration is maintained by the General Land Office.

THE PUBLIC LANDS

Of the total land area of 1,442,267,520 acres in the public-land States and of 365,481,600 acres in the Territory of Alaska, there had been surveyed at the close of the 1943 fiscal year 1,322,903,345 acres in the States and 2,321,304 acres in Alaska. This leaves 119,364,175 acres still to be surveyed by the General Land Office in the States and 363,160,296 acres in Alaska.

As of June 30, 1943, the area of public lands remaining in Federal ownership, including Indian reservations, amounted to about 400,000,000 acres in the public-land States and about 365,000,000 acres in Alaska. Of these, 394,000,000 acres were vacant and unreserved, as follows: 38,000,000 acres in the States outside Federal grazing districts; 131,000,000 acres within such districts; and 225,000,000 acres in Alaska.

The total acreage patented with minerals reserved to the United States increased during the year to 48,505,718 acres, as shown by the following table:

Acreage of lands patented with minerals reserved to the United States, as of June 30, 1943

Type of mineral reservation	Patented during fiscal year 1943	Total patented through June 1943
Reservation of all minerals:		
Under stock raising act.....	1 98, 825	33, 532, 155
Under other acts.....	311, 755	2, 209, 269
Total.....	410, 580	35, 741, 424
Reservation of specific minerals:		
Coal.....	8, 506	10, 854, 583
Others 2.....	49, 989	1, 909, 711
Total.....	58, 495	12, 764, 294
Grand total.....	469, 075	48, 505, 718

1 Includes 2 Indian trust patents (166 acres). 2 Includes coal reserve in combination with other mineral

LEASES AND PERMITS

During the year an additional area of 1,044,298 acres was brought under lease, including mineral licenses and permits, making a total of 15,319,561 acres under lease at the end of the year. The types of leases in force as of June 30, 1943, are shown by the following tables:

Mineral leases, permits, and licenses outstanding as of June 30, 1943

Mineral	Leases		Permits		Licenses		Total	
	Num-ber	Acres	Num-ber	Acres	Num-ber	Acres	Num-ber	Acres
Oil and gas:								
Producing.....	1,492	689,654.93	-----	-----	-----	-----	1,492	689,654.93
Prospecting.....	2,040	2,014,575.26	-----	-----	-----	-----	2,040	2,014,575.26
Total.....	3,532	2,704,230.19	-----	-----	-----	-----	3,532	2,704,230.19
Coal.....	363	74,386.08	138	108,780.66	101	3,363.20	602	186,529.94
Phosphate.....	9	6,464.24	-----	-----	-----	-----	9	6,464.24
Potash.....	19	44,532.10	1	2,538.68	-----	-----	20	47,070.78
Sodium.....	4	1,872.88	124	203,192.93	-----	-----	128	205,065.81
Grand total.....	3,927	2,831,485.49	263	314,512.27	101	3,363.20	4,291	3,149,360.96

Leases other than mineral leases outstanding, as of June 30, 1943

Type of lease	Number	Acres	Annual rental
Aviation.....	43	28,192.20	535.00
5-acre tracts.....	300	1,500.00	1,490.00
Fur farm (Alaska).....	21	136,080.00	850.00
Grazing (Alaska).....	9	1,168,953.93	1,269.35
Grazing (O & C).....	158	208,678.86	4,735.60
Grazing (Taylor Act, sec. 15).....	9,984	10,547,306.22	210,480.07
Recreational.....	19	18,895.82	1,366.63
Water well.....	11	440.00	460.50
Others.....	3	153.01	10.00
Total.....	10,548	12,170,200.04	221,197.15

¹ Does not include rentals of 2 business site leases, the rentals of which are based on gross receipts.

² Does not include rental of 1 lease, the rental of which is based on receipts.

Homesteads, Sales and Other Entries

Continued decrease in the area of public lands entered and patented is shown by the tables which follow. The totals given indicate a decrease over last year of 53 percent in the area represented by original entries, of 33 percent in the area embraced in entries finally approved, and of 40 percent in the area patented and certified. The number of entries involved, however, declined only 32 percent for original entries and only 1 percent for final entries. The small decreases in final entries as compared to original entries reflects the increasing relative importance of cash entries, most of which are not reported as original entries when initiated. The number of patents issued increased 10 percent over last year, indicating the increasing volume of work involved in the issuance of special types of patents.

compared with the area of the Territory. Popular concepts of settlement possibilities in Alaska all too often are predicated on inadequate knowledge of widely varying physical characteristics and the sharp and critical climatic differences which exist, and fail to take into account the problem of adequate community services. Thus, classification would help insure the procurement by prospective settlers of lands suited to their needs and guard against entry and selection for inappropriate uses.

Recognizing that this problem would be of immediate concern in connection with portions of the public domain adjacent to the new Alaska Highway, the General Land Office during the year began a series of special studies and field investigations by land classification experts to secure the most efficacious use of the tracts in the post-war period.

POST-WAR PROBLEMS

The mobilization of landpower, like the mustering-in of manpower, brought with it definite problems of administration for solution when peace will have been restored. Many of these questions, obviously, have not yet reached the point of crystallization. However, their potentiality as factors in the post-war public land pattern was given recognition and consideration by the General Land Office consistent with the demands of its current tasks during the year.

Foremost among the subjects requiring careful consideration is that of post-war disposal or administration of lands which have been allocated to military uses. Many millions of acres of public lands withdrawn for military purposes are subject to restoration to the public domain within six months after the end of the war. The fitting of these areas into the peace-time land pattern of the Nation entails problems of administration which the General Land Office is laying plans to meet.

RECOMMENDATIONS

The fighting of a war on the home front, no less than in the battle areas, often reveals inadequate technical procedure or equipment whose replacement or augmentation would be of material aid in both military and post-combat operations. Such a situation frankly exists with respect to some features of public land administration. With a view to assisting in bringing about the desired improved conditions, the following recommendations are made by the General Land Office, based upon its experience in land administration:

1. Developments in the field of mineral resources point to the desirability of revisions in old mining statutes which, while stimulating private enterprise and effort, will safeguard and strengthen the

public interest by providing for economical and efficient operation and the elimination of wasteful practice through effective administration. Mining activities on the public domain, in an effort to meet the war demands for critical and strategic minerals, have served to emphasize the need for the revisions pointed out in last year's report.

Among these revisions would be the enactment of a unified leasing system applying to all minerals not now subject to leasing both in the public domain and in other lands acquired by the Federal Government. These deposits are the property of all the people and should, under proper administrative authority, be made to serve the public weal, rather than be susceptible to wasteful exploitation, as has been possible under conditions as they now exist.

Moreover, new interest in the possibilities of producing strategic and other minerals from public-domain lands has arisen because of the requirements of the war and threats of post-war shortages. Some procedure should be made available, therefore, under which the Government would be enabled to assist private industry in conducting additional exploratory work for minerals on public-domain lands to alleviate these shortages and retrieve any gains from the discovery for the benefit of the public as a whole. Such a procedure would make it economically feasible to carry on much exploratory work not otherwise possible.

2. The increased demands for natural resources to meet military and post-war needs makes complete knowledge and understanding of the character and status of the public lands imperative factors in their proper development and efficient administration. The fact that at the present time evidence of the filing of thousands of unpatented mining claims is not made a matter of Federal record is a serious obstacle to such understanding. The enactment of legislation to enable the filing of such evidence in the General Land Office is urgently recommended.

3. At the present time there is no means available by which accurate, detailed information can be secured concerning the real estate holdings of the various branches of the Federal Government. The establishment within the General Land Office of a centralized, consolidated inventory of all such land records, as a logical supplement to data already in its custody, is recommended as a solution of this problem.

4. Legislative authority for the extension of the protection afforded by land classification to settlement activities in Alaska is of urgent concern. This need is particularly emphasized because of the Alaska highway and other developments which have increased the accessibility and desirability of the Territory to prospective settlers.

The decrease in the number and area of entries did not diminish materially the great variety of cases adjudicated during the year.

Original entries and selections ¹ fiscal year 1943

Type of entry of selection	Public lands		Ceded Indian lands		Total	
	Number	Acres	Number	Acres	Number	Acres
Homestead entries:						
Stock raising.....	14	6,944.76			14	6,944.76
Enlarged.....	8	2,080.45	1	200	9	2,280.45
Reclamation.....	37	4,707.52	(?)	100	37	4,807.52
Forest.....	1	56.69			1	56.69
Sec. 2289 R. S., et al.....	151	15,160.34	1	40	152	15,200.34
Total homestead entries.....	211	28,958.76	2	340	213	29,298.76
Other entries and selections:						
Desert land entries.....	11	1,708.90			11	1,708.90
State selections.....	57	24,914.70			57	24,914.70
Timber and stone applications.....	4	359.80			4	359.80
Mineral applications and adverse claims.....	85	6,493.54			85	6,493.54
Town lots.....	19				19	
Lieu selections.....	2	241.21			2	241.21
Total other entries and selections.....	178	33,808.15			178	33,808.15
Grand total.....	389	62,766.91	2	340	391	63,106.91

¹ An original entry or selection is one made in pursuance of an act of the Congress which prescribes the terms and conditions under which patent may be issued or other evidence of title granted. An original entry becomes a final entry upon compliance by the entryman with further requirements of the law, such as residence or additional payment, and upon the issuance of a final certificate. A State selection becomes final upon certification by the Commissioner of the General Land Office.

² Two entries amended.

³ Town lots upon which only part payment was made.

⁴ Area not tabulated.

Final entries ¹ fiscal year 1943

Type of entry of selection	Public lands		Ceded Indian lands		Total	
	Number	Acres	Number	Acres	Number	Acres
Homestead entries:						
Stock raising.....	140	70,848.40	14	6,568.67	154	77,417.07
Enlarged.....	12	3,044.73	6	1,012.23	18	4,056.96
Reclamation.....	159	16,705.80	24	2,372.94	183	19,078.74
Forest.....	6	367.08			6	367.08
Commuted.....	4	520.00	14	920.00	18	1,440.00
Sec. 2289 R. S., et al.....	101	10,563.18	19	1,528.51	120	12,091.69
Total homestead entries.....	422	102,049.19	77	12,432.35	499	114,481.54
Other entries:						
Desert land entries.....	39	4,988.53			39	4,988.53
Public auction sales ²	256	22,025.46			256	22,025.46
Timber and stone entries.....	4	359.80			4	359.80
Mineral entries.....	93	7,520.96			93	7,520.96
Town lots.....	215	(?)	24	(?)	239	
Miscellaneous cash entries.....	146	9,511.26			146	9,511.26
Other.....	69	8,687.76	1	71.50	70	8,759.26
Total other entries.....	852	53,043.77	25	71.50	877	53,115.27
Grand total.....	1,274	155,142.96	102	12,503.85	1,376	167,646.81

¹ A final entry is one upon which final certificate has been issued showing that the law has been complied with and that in the absence of irregularity, the entryman or claimant is entitled to a patent. If the requirement of the law has been met, the equitable title to the land passes to the claimant upon the issuance of the final certificate.

² Isolated tracts.

³ Area not tabulated.

⁴ Indian tribal lands.

Patents and certifications,¹ fiscal year 1943

Type of patent	Public lands		Ceded Indian lands		Total	
	Number	Acres	Number	Acres	Number	Acres
Homestead patents:						
Stock raising.....	186	97,329.58	6	1,329.70	192	98,659.28
Enlarged.....	21	6,233.39	3	240.00	24	6,473.39
Reclamation.....	213	21,343.90	9	835.17	222	22,179.07
Forest.....	7	621.91			7	621.91
Commuted.....	5	600.70			5	600.70
Sec. 2289 R. S., et al.....	121	13,259.98	4	240.00	125	13,499.98
Total homestead patents.....	553	139,289.46	22	2,644.87	575	141,934.33
Other patents:						
Desert land.....	45	5,045.49			45	5,045.49
Public auction ²	289	24,896.92			289	24,896.92
Timber and stone.....	5	397.09			5	397.09
Mineral.....	170	14,026.92			170	14,026.92
Indian.....	12	369.92	627	3 62,951.65	639	63,321.67
Miscellaneous cash sale.....	290	16,797.67			290	16,797.67
Exchange.....	191	233,491.15			191	233,491.15
State grants.....	22	110,108.83			22	110,108.83
Curative and supplemental.....	518	(³)			518	
Other.....	74	4,358.77	2	3 71.72	76	4,430.49
Total other patents.....	1,616	409,492.76	629	63,023.37	2,245	472,516.13
Total all patents.....	2,169	548,782.22	651	65,668.24	2,820	614,450.46
Certified to states.....		22,455.41				22,455.41
Grand total.....	2,169	571,237.63	651	65,668.24	2,820	636,905.87

¹ Where upon final examination it is found that an entry or selection is in proper form and that the law has been complied with, a patent conveying the legal title to the claimant is issued. In the case of certain state selections, the legal title is conveyed upon approval thereof by the Secretary of the Interior and certification by the Commissioner of the General Land Office.

² Isolated tracts.

³ Indian tribal lands.

⁴ Acreage not counted because previously reported.

Land Grants

Pursuant to public policy under which more than 300,000,000 acres of public lands, in addition to rights-of-way, have been granted to local governments and corporations for internal improvements and other public purposes, the General Land Office during the year conveyed title to 134,722 acres of grant lands. Grants to States included 320 acres of desert land (Carey Act), 217 acres of swamp land, 15,788 acres of indemnity school land selections, 109,572 acres of State park selections, 160 acres of reform school selections, and 6,508 acres selected for miners' hospitals. Under the Transportation Act of 1940, which provides for the issuance of patents to railroads to cover grant lands sold by them to innocent purchasers for value prior to September 18, 1940, 2,157 acres were patented to the Northern Pacific Railroad. In addition to these grants, 13 patents were issued to States to give them additional evidence of title to 5,291 acres of previously granted school sections.

Of the 336 applications for rights-of-way for railroads, irrigation, telephone and telegraph lines, public roads, pipe lines, and other purposes approved during the year, 163 involved permits or easements with an annual rental of \$3,690 and 12 were temporary rights-of-way over O. & C. lands producing an annual rental of \$140.

Land Exchanges

Exchanges of land with private owners resulted in the addition of 79,910 acres to grazing districts in exchange for 22,415 acres of Federal land, 2,773 acres to a migratory bird refuge in exchange for 3,121 acres; 721 acres to Indian reservations in exchange for 680 acres, and 223,795 acres to national forests in exchange for 24,202 acres of land plus sufficient timber to equalize the values involved.

Exchanges of lands with States under the Taylor Grazing Act made on an equal basis amounted to 183,073 acres.

Receipts and Expenditures

Receipts during the year totaled \$9,758,066, the highest since 1926, while expenditures from appropriations amounted to \$2,304,416. Rentals, royalties, and bonuses from mineral leases and permits accounted for 80 percent of the total receipts and sales of timber from O. & C. and Coos Bay lands for an additional 16 percent. Fees and commissions and sales of public and Indian lands which prior to the Mineral Leasing Act constituted the bulk of receipts from the public lands, amounted to less than \$200,000.

Pursuant to the provisions of various laws, 40 percent of the total receipts will be distributed to the various States and counties and 43 percent will be credited to the Reclamation fund. Indian trust funds will be credited with \$8,901.

The following table shows the receipts earned during the year, by sources and by Treasury accounts.

Disposition of receipts of the General Land Office,¹ fiscal year 1943

Source of receipts	Covered in the Treasury earmarked for—				
	General fund	Reclamation fund	States and counties	Indian trust funds	Total
Sales of public lands.....	\$26,251.48	\$97,654.20	\$4,493.99	-----	\$128,399.67
Fees and commissions.....	11,290.77	37,664.06	-----	-----	48,954.83
Mineral leases and permits:					
Mineral Leasing Act.....	717,612.80	3,767,467.18	2,691,047.98	-----	7,176,127.96
Red River oil and gas lands.....	-----	-----	2,488.13	\$4,146.87	6,635.00
Potash.....	42,993.55	[†] 269,362.38	161,225.83	-----	473,581.76
Other.....	[‡] 134,128.22	-----	-----	-----	134,128.22
Total mineral.....	894,734.57	4,036,829.56	2,854,761.94	4,146.87	7,790,472.94
Oregon and California grant lands.....	410,303.40	-----	[§] 950,423.47	-----	1,360,726.87
Coos Bay grant lands.....	130,361.51	-----	[§] 26,000.00	-----	156,361.51
Taylor Act grazing leases.....	48,477.82	[§] 48,477.82	96,955.64	-----	193,911.28
Rights-of-way leases.....	30,044.39	-----	-----	-----	30,044.39
Sales of Reclamation town lots.....	-----	6,758.17	-----	-----	6,758.17
Sales and lease of Indian lands.....	-----	-----	-----	4,754.12	4,754.12
Copying fees.....	16,923.65	-----	-----	-----	16,923.65
Miscellaneous.....	20,759.05	-----	-----	-----	20,759.05
Grand total.....	1,589,146.64	4,227,383.81	3,932,635.04	8,900.99	9,758,066.48

¹ Before final settlement of all accounts by the General Accounting Office.

² Includes \$43,646.22 collected in California under act of Oct. 2, 1917 (40 Stat. 297).

³ Includes \$17,076.59 collected in Wyoming under act of June 26, 1926 (44 Stat. 1621), \$10,107.15 collected in Alaska, and \$106,944.48 collected in California under Executive Order No. 9087 dated March 5, 1942.

⁴ Includes \$270,060.04 as final payment under act of July 13, 1926 (44 Stat. 915).

⁵ Estimated.

⁶ Range improvement fund.



Office of Land Utilization

LEE MUCK, Assistant to the Secretary

THE Office of Land Utilization is charged, under Administrative Order 1466, dated April 15, 1940, with the responsibility of coordinating and integrating the land-use and land-management activities of the several bureaus and agencies of the Department; the establishment and development of sound forestry practices; the general administration of soil and moisture conservation work; and the maintenance of cooperative relations with the Federal, State, and private agencies concerned with the protection, conservation, and prudent use of the land and natural resources of the United States and Alaska.

The advent of the war necessitated a reorientation of the activities of the agencies of the Department having control over natural resources. Without endangering gains already made in the management of the Federal estate or in any way compromising the conservation aims of the Department, the Office of Land Utilization has, during the fiscal years 1942 and 1943, given first attention to directing coordinated land-management programs so as to increase timber production and to augment the quantity and quality of products from western range lands. Increased amounts of timber, food, and other raw materials now are flowing directly into war channels from forest, range, and other types of lands under the supervision of the Department of the Interior.

In recognition of the requirements of the war, action has been taken toward the restriction of developmental activities to those that are urgently essential to a maintenance of existing values and to the highest possible contribution to the effective prosecution of the war. A discussion of the principal programs in progress on Department of the Interior lands, with which the Office of Land Utilization is directly concerned, follows.

FOREST MANAGEMENT

The forest resources under the jurisdiction of the Department of the Interior are so located and so well developed that substantial contributions to the prosecution of the war were made possible during the fiscal year 1943. Shortly after Pearl Harbor, the Department of the Interior set up a production goal of 1 billion feet board measure of timber to be utilized from the Oregon & California Railroad and Coos Bay Wagon Road grant lands and from the Indian forests. Timber-cutting was increased immediately, and the sale of additional timber was authorized both from Indian and from O. & C. lands.

During the year a total volume of 432,302,000 feet board measure, having a value of \$1,315,541, was cut from the O. & C. forests. Thus, for the second consecutive year, the sustained-yield capacity of 500 million feet board measure per annum, prescribed by the act of August 28, 1937 (50 Stat. 874) was approached. One hundred and seventy-one new timber sale contracts on the O. & C. lands were entered into during the fiscal year 1943 covering a total volume of 485,029,000 feet board measure, for which purchasers contracted to pay a total of \$1,915,964. The cost of administration and protection on the O. & C. lands for the fiscal year 1943 was \$262,463, which, compared with the cash receipts for that period of \$1,580,328, reflects a ratio of cost to income of about 17 percent.

This contribution to the prosecution of the war was accomplished without deviating from the departmental policy of preventing destructive methods of logging and by providing for early restocking of areas in the process of development and the furtherance of the ideal of cooperative sustained-yield management between the O. & C. lands, the private owners of adjacent lands, and local mills.

The sales of timber from Indian forests also were increased during the fiscal year 1943, thereby providing a substantial increase in the income received from these forests. As on the O. & C. lands, the operations on Indian lands were conducted in full accordance with the departmental conservation policies. The conservation aspects of good forest management were in no way subordinated to the utilization program.

SOIL AND MOISTURE CONSERVATION OPERATIONS

The Soil and Moisture Conservation Operations of the Department of the Interior are conducted pursuant to the provisions of the Soil Conservation Act and Reorganization Plan No. IV. The program is coordinated by the Office of Land Utilization with a view to obtain-

ing a unified objective and eliminating overlapping and duplication of effort. However, in recognition of the principle that this function can be best performed by the agencies administering the land, field operations are conducted by the six land-management agencies of the Department.

An appropriation of \$1,340,000 was authorized for the fiscal year ended June 30, 1943, and since this was substantially less than the amount of \$2,178,700 authorized for the fiscal year 1942, soil and moisture conservation operations on the Federal estate were greatly reduced. As a result the program was entirely reorganized with a view to concentrating upon the more critical areas and promoting the highest possible degree of production consistent with the limited funds available for the vast area in need of rehabilitation.

The state of erosion which exists on lands administered by the Department of the Interior requires corrective action on approximately 60 million acres, or about 21 percent of the total area under management. Extensive areas have been depleted of their natural vegetative cover and sheet erosion has, in many cases, removed a large volume of the top soil. Restoration of the vegetative cover through range reseeding operations and control of the use of the land through water development, fencing, and the application of sound land-use management practices constitute the principle measures being applied. However, some of the areas have been so seriously eroded that the application of more intensive methods of control are essential, regardless of the inadequacy of the appropriation made available.

Since the lands under the jurisdiction of the Department of the Interior are being intensively used for grazing and other purposes, it has been the policy of the Department to promote a high degree of cooperation with the users of the land. The great majority of these permittees and lessees are fully aware of the need for soil and moisture conservation work on the public lands and have cooperated to the fullest possible extent in the prosecution of the program. The cooperation received has resulted in the contribution of money, services, labor, and materials from private individuals; the contribution of funds by the States; adjustments in operations on intermingled privately owned lands; and the assumption of responsibility for the maintenance of the projects by the users of the land. The value of the contributions received has been estimated at approximately one-quarter of a million dollars for the fiscal year 1943, which amount when considered with the value of the good will secured in the promotion of conservation practices, reflects a substantial accomplishment.

The approved work program of the Department for the fiscal year 1943 covered operations on 267 projects in 18 States. Extensive areas

were reseeded to species of adaptable vegetation, and a large number of water facilities were installed to insure an even distribution of the livestock on the range; diversion ditches were constructed with a view to providing flood-water irrigation; rodent-control operations were performed on thousands of acres; drift and division fences were constructed where absolutely necessary, and gully-control measures applied above irrigation projects. The results accomplished, when considered in the light of the limited funds available, can be viewed with a high degree of satisfaction and clearly demonstrate that the application of practical low-cost measures can be made highly productive.

WHITE PINE BLISTER RUST CONTROL

There are within the lands administered by the Department of the Interior 682,583 acres of valuable white pine stands which require protection from the white pine blister rust—a fungus disease of foreign origin which became established in this country 30 years ago. This disease is fatal to white pines, including three of the most valuable timber trees in the United States, namely: the eastern white pine, the western white pine, and the sugar pine. The purpose of white pine blister rust control operations is to protect these valuable pines by the eradication of *Ribes* (currant and gooseberry bushes), the alternate host of the disease.

Under the provisions of the act of April 26, 1940 (54 Stat. 168, 169), all white pine blister rust control appropriations for Federal lands are combined in one appropriation item carried in the annual appropriation for the Department of Agriculture. For the fiscal year 1943, \$174,910 was appropriated for this work on Department of the Interior lands and made available to the National Park Service, the Office of Indian Affairs, and the O. & C. Lands Administration of the General Land Office.

Progress of the control work on Department of the Interior lands has been slow and barely has kept abreast of the spread of the disease. During the calendar year 1942, 24,671 acres were worked for the first time and 6,481 acres were reworked. As of January 1, 1943, 360,630 acres had received initial eradication, or 53 percent of the total acreage requiring protection.

PROTECTION OF FORESTS, FOREST INDUSTRIES, AND STRATEGIC FACILITIES

With \$779,600 provided by the Sixth Supplemental Appropriation Act of 1942 and \$95,900 by the Interior Appropriation Act of 1943, the

emergency fire protection program of the Department was continued during the year. This program, made necessary by the war, provides emergency fire protection for the forest and range resources, forest industries, and strategic facilities situated on the forest, brush, and grasslands of the Department located within a 300-mile zone of the Atlantic and Pacific coasts and the Gulfs of Mexico and California.

It is estimated that there are 364 million acres of forest, brush, and grassland under the jurisdiction of the Department requiring protection from fire. Approximately 272 million acres (47 million in the continental United States and 225 million in Alaska) of this area need special protection by reason of the war. The lands requiring emergency protection are administered pursuant to congressional enactment by five agencies of the Department, namely: the Grazing Service, the General Land Office, the Office of Indian Affairs, the National Park Service, and the Fish and Wildlife Service.

These lands support some of the finest stands of virgin timber and a major portion of the best publicly owned range lands in the United States. On the lands under the administration of the Department in the 11 Western States are 2,608 military, industrial, transportation, communication, power, water, and mining facilities of strategic importance to the war.

It is a major responsibility of the Department to protect from fire, sabotage, and other hazards all forest, brush, and grass resources and associated strategic facilities located on or adjacent to lands under its jurisdiction. Forest or range fires not only would materially damage or utterly destroy the renewable natural resources but might interfere with the operation of strategic facilities, thereby becoming a real hazard and deterrent to the war program.

The emergency fire-protection program of the Department is not a duplication of existing protection activities afforded through regular appropriations but is an intensification of normal fire protection. The program provides for the employment of approximately 500 fire guards stationed in critical areas where past experience has indicated the fire risk was high and the hazards great and where quick fire-suppression action is imperative in the prevention of heavy losses and damage.

As a corollary to the main program, action was taken during the year to strengthen cooperative plans between the action agencies of this Department with action agencies of the Department of Agriculture. A formal memorandum of understanding providing for permanent coordinated action in fire control was approved by the Secretaries of Interior and Agriculture in January 1943.

The fire season for the calendar year 1942 was decidedly encouraging. Favorable weather played a relatively large part in holding losses to a minimum, but the fact that organized and trained guards were made available through the emergency fire protection program assisted materially in holding acreage losses to a low level. During the calendar year 1942 the action agencies of the Department reported 3,316 fires which burned over 1,879,613 acres of federally owned lands. This loss is approximately one-half of 1 percent of the total area requiring protection.

JAPANESE RELOCATION COMMUNITIES

Acting pursuant to Executive Order 9102, dated March 18, 1943, which established the War Relocation Authority for the purpose of relocating Japanese evacuees, the Secretary of the Interior and the Director of the War Relocation Authority entered into agreements providing for the location of Japanese communities on lands under the jurisdiction of the Department of the Interior. Agreements were entered into covering lands within the Tule Lake Reclamation project, California; the Minidoka Reclamation project, Idaho; the Heart Mountain Reclamation project, Wyoming; the Colorado River Indian Reservation, Arizona; and the Gila River Indian Reservation, Arizona. The evacuee communities located upon these lands had a total evacuee capacity of 71,000 Japanese, and lands totaling approximately 122,000 acres were authorized to be made available for development by and the use of these people during the duration of the war.

The Assistant to the Secretary in Charge of Land Utilization was designated to represent the Department in its negotiations with the War Relocation Authority incident to the settlement of the Japanese evacuees upon lands under the jurisdiction of the Department. Land-use permits covering practically all of the projects were executed and approved by the Secretary during the fiscal year ended June 30, 1943, thus largely completing the liaison responsibility with the War Relocation Authority so far as the execution of agreements and permits for the use of Department of the Interior lands is concerned.

CIVILIAN PUBLIC SERVICE CAMPS

Under date of March 12, 1943, the Secretary informed the Director of the Selective Service System that the Office of Land Utilization would henceforth represent the Department in all matters pertaining to the operation of work camps for conscientious objectors assigned to this Department.

Under the authority of the Selective Training and Service Act of 1940 (Public, No. 783, 76th Cong.), the Director of the Selective Service System was authorized to establish projects of national importance to which may be assigned persons found under section 5g of the act to be conscientiously opposed to participation in combatant and noncombatant training and service in the land or naval forces of the United States. Under this authority the Director of the Selective Service System authorized the organization of certain camps on Department of the Interior lands. At the end of the fiscal year there were 10 active camps assigned to the action agencies of the Department as follows: National Park Service, 5; Fish and Wildlife Service, 1; General Land Office, 1; and Bureau of Reclamation, 3. Of the three camps assigned to Reclamation projects, the camp at the Mancos project, Colorado, is the first fully Government-operated Civilian Public Service camp authorized by the Selective Service System. Entire responsibility not only for the work program but also for the feeding, housing, clothing, care, and discipline of the assignees has been assumed by the Bureau of Reclamation.

The work of these camps was slightly revised during the year to place more emphasis upon forest and range protection, a project of vital national importance. All camps are now being utilized principally for fire protection and for projects having a direct relation to the protection and conservation of the natural resources of the Nation.

LAND-DEVELOPMENT PROGRAMS

Although the Office of Land Utilization has been concerned largely with activities directly related to the war during the past fiscal year, the large volume of work accomplished in that field has not prevented the carrying on of effective planning looking to the conservation and fuller utilization of the Federal lands under the jurisdiction of the Department of the Interior. Working in close cooperation with the National Resources Planning Board and the Department of Agriculture, a reservoir of land- and resource-development projects has been assembled; many of these have been carefully evaluated and given a high priority rating; and a well-rounded program will ultimately be available for prosecution in the event the construction of public works is authorized for the stabilization of employment after the termination of hostilities.

The formulation of post-war land and resource programs is largely the responsibility of the Departments of Agriculture and Interior, and steps have already been taken for the establishment of a high degree of cooperation and the securing of unified action in that field. The

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work to be accomplished consists of: the completion of the 6-year programs and the analysis and consolidation thereof for budget purposes; the inauguration of surveys and investigations and the preparation of detailed plans which will make it possible to initiate construction when funds are made available; the establishment of project priorities and the development of alternative lists designed to meet varying conditions with respect to the size of projects, timing, and degree of employment to be provided; and the coordination of Interior Department programs with those of other Federal departments and States with a view to eliminating duplication and conflict.

A soundly conceived land- and resource-development program is an essential part of public works expenditures designed to stimulate a high level of employment and production. A substantial part of such a program will be largely self-liquidating through the establishment of a maximum degree of production and increased returns from the resources under management. The future is unpredictable, but it seems clear that the value of the land and its resources will continue to increase and that the maintenance thereof at a high level of production is essential to the future of the Nation. Consequently, the formulation of land-improvement programs, as briefly outlined above, is a major responsibility of management organizations, and the successful prosecution thereof is definitely in the public interest.

Grazing Service

R. H. RUTLEDGE, Director

PEAK demands for meat, wool, hides, and mohair during the fiscal year 1943 confirmed the wisdom of range conservation principles fostered by the Taylor Grazing Act of 1934, and the Grazing Service pushed its program in every quarter to increase supplies of these products without overgrazing the range. In close cooperation with producers and with war agencies, the energy of the Service was shifted to activities that would help carry the fight to the enemy. One of the grazing district advisory boards expressed the feeling of the range livestock industry by a resolution in these words:

Be it resolved that as the progress and duration of the war make necessary additional and greater sacrifices in the lives of all, we stand ready to subordinate all to the prosecution and winning of the war, and with this high resolve we pledge full cooperation.

Range improvement work was cut to bare essentials, while the construction of access roads to strategic mineral deposits and land activities for military needs gained in momentum as the year advanced.

War is wasteful of resources, and to keep them in and on the ground merely for the purpose of saving them will not help to save lives, but when victory is won replenishment of resources will be in order. In giving principal attention to the immediate goal, consideration was also given to the job that lies ahead. Plans to repair and improve the range and to furnish post-war employment were revised and kept current.

Believing that more "home ranch" feeding will shorten the time between the range and the cooler and speed up consumer supplies, as well as bring livestock numbers down to the safe winter carrying capacity of range and ranch, the Grazing Service is encouraging the producer to finish for slaughter as much range stock as possible.

No public agency can hope to accomplish its broader objectives under changing conditions without the support and cooperation of

those who are most directly affected. Stockmen using Federal range supported the food program, and in many cases made drastic adjustments in order that adequate public land could be set aside for aviation and other military training.

Despite wartime difficulties, the livestock industry has undertaken its current task of greater production through increased weight and quality of livestock. Such means as improved methods, better range management, reduction of mortality losses, streamlined procedures, and labor-saving devices wherever feasible were employed, and the Grazing Service encouraged these efforts by liberalizing established rules and policies where that was necessary in order to attain this end.

A survey of the results to date indicates a prospect for increased meat supplies from the Federal range to the extent of 85 million pounds in the calendar year 1943 and of 124 million pounds in 1944. The turn-off of livestock products from the Federal range in 1942 was estimated at 800 million pounds of meat and 80 million pounds of wool. In addition there were produced large amounts of mohair and horse meat.

Funds.—Congress appropriated \$839,300 for Grazing Service salaries and expenses. Funds allotted for range protection and improvement totaled \$830,776; for construction of access roads, \$924,500; for liquidation of CCC, \$121,000; for miscellaneous purposes including advisory board contributions, \$210,802.86. This represents a decrease in operating funds of \$651,951.08 from the previous year.

Liquidation of CCC.—Grazing Service CCC camps were closed and the Corps was liquidated during the year. Many of the experienced foremen and engineers were reemployed on the construction of access roads.

Grazing fees.—Earned grazing fees totaled \$785,140.77 in 10 States, of which \$329.22 is for the credit of Indians and \$392,405.78 is made available to the States affected under the provisions of the Taylor Grazing Act. State revenues from this source for the 8-year period, 1936–43, now total \$2,655,117.47. Distribution of 50-percent fund payments to 10 States for the fiscal year 1943 and for the years 1936–43—the latter in parentheses—are: Arizona, \$17,662.09 (\$131,019.12); California, \$10,314.80 (\$83,822.83); Colorado, \$22,544.41 (\$160,280.21); Idaho, \$35,035.80 (\$264,794.00); Montana, \$26,587.53 (\$109,521.73); Nevada, \$65,285.42 (\$407,841.92); New Mexico, \$59,699.58 (\$419,887.04); Oregon, \$27,795.21 (\$193,770.43); Utah, \$71,286.55 (\$509,653.54), and Wyoming, \$56,194.39 (\$374,526.65). The above States contributed \$107,617.35 to the Secretary in 1943 to be used for range improvements under State and Federal law, bringing the amount contributed to date for such purposes to \$504,660.98.

Personnel.—Despite a 48-hour week occasioned by the overtime act, considerable unrecorded additional hours both in field and office were necessary to keep pace with expanded war activities and added work load occasioned by unprecedented personnel turn-over. Reduction in positions in conformance with Senate Joint Resolution No. 170 totaled 28. The number of positions voluntarily allowed to lapse as an economy measure was 36. Authorized positions were reduced from 462 to 398, a net reduction of 64. At the close of the year, the clerical, administrative, and technical staff, of whom 153 are women, totaled 385 employees, leaving 13 authorized positions temporarily unfilled. In addition, there were 595 district advisers intermittently employed at the call of the regional graziers. Three hundred eighty-five employees were engaged in the construction of access roads. In addition, 230 temporary and wage employees were engaged in other seasonal activities.

Training.—By means of staff conferences, discussions, and memoranda, an endeavor was made to familiarize employees, especially the younger groups, with policy and procedure, and to keep all employees in step with the tempo of war. In counseling programs three main points were stressed: (1) the job must be done, (2) no alibis, and (3) only victory workers can bring victory. Observing these principles, the organization advanced toward the main objective.

Equipment and supply.—Procurement of priority materials consistent with war needs was held to a minimum in conformance with the governmental requirements plan established by the War Production Board. About 70 percent of the former CCC property was transferred and distributed to the military. Much of the heavy equipment went to the Alaskan Highway. Certain equipment, not considered vital to the military, was retained on loan and used for access roads and fire control. As the year advanced it became increasingly necessary to rent a number of tractors, graders, jackhammers, and compressors from private sources.

Nonessential driving was eliminated, travel was minimized, and whenever possible, official trips were made by common carrier or by pooling of official cars. Passenger-carrying automobile mileage was reduced 45 percent from that of the previous year.

Salvage.—By gathering everything from obsolete rubber stamps to tractor parts, and by cooperation with local salvage committees in 200 counties, a total of 14 million pounds of rubber and scrap metal was turned over to appropriate authorities. Surplus top grade material turned over to the Treasury Department included 941 tires and 1,094 tubes.

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Office management.—All regions suffered heavy losses in experienced personnel, especially in key positions such as accounting and property clerks. The turn-over of clerks in one region was 100 percent and averaged 50 percent in the field as a whole, resulting in reduced volume and quality of essential paper work. Field audits were completed in only 3 of the 10 regions. Fiscal work was kept current, but if all books, records, and reports are to be maintained and examined in accordance with standard requirements one additional auditor should be employed.

Analyses of 55 of the 58 grazing districts on a job load basis are now complete. The clerical work load was analyzed in two regional offices in order to furnish a basis for required reports to the Bureau of the Budget.

Wartime use of the Federal range.—Public Law 586, Seventy-seventh Congress, approved June 5, 1942, authorizes the Secretary of the Interior to dispose of timber and other products of the public lands through sale or lease, on terms prescribed by him, for use in connection with the manufacture of arms, ammunition, and implements of war or the production of equipment, supplies, and materials usable in such manufacture. To date approximately 400,000 acres have been affected by this legislation. The Grazing Service assisted war agencies in the solution of numerous land problems such as appraisal work under the act of July 9, 1942. Joint examinations of areas proposed for military use have resulted in withdrawals to date of 3½ million acres and the issuance of special-use permits on 12 million acres within grazing districts. Additional areas outside of grazing districts were examined upon request and the results were forwarded to the appropriate military authorities for consideration.

Several examples of special-use permits may be cited. One in Idaho is typical. In that State a certain range needed for gunnery practice is used part of each year by 175 ranchers operating 230,000 sheep and 1,000 cattle. The area was divided into two units, one being grazed by livestock during the period and the other used for gunnery range. At the proper grazing season the gunners and the stockmen exchanged areas, resulting in full service for both types of use. In this way normal production of livestock was maintained and trigger fingers were kept in shape for more serious business abroad.

Certain eliminations of livestock from scenes of urgent military operations were necessary. One such area affected 47 livestock operators and involved 8,421 cattle, 618 horses, 12,432 sheep, and 10,681 goats. In the aggregate, however, 484,000 sheep and 15,905 cattle still graze on Federal range that is also used for military purposes. The Grazing Service assisted the War Department in the

establishment of compensation values to ranchers, as provided by the act of July 9, 1942.

Mine roads.—Hidden in the ground are untold resources which are essential to the war program. Among these are minerals and other strategic materials. To stimulate the movement of such materials from mine to mill, Congress authorized the expenditure of 10 million dollars for the construction of access roads under the Defense Highway Act. The Grazing Service was among the agencies selected to do this type of work. Arrangements were made for regional officers to receive applications from owners and operators of small mines, and very soon thereafter 509 projects had been processed, and construction of roads leading to deposits of about 30 different types of strategic minerals was under way. At the end of the year 782 miles of access roads had been completed at a total cost of \$792,092.87. As a result, thousands of additional tons of copper, lead, zinc, manganese, vanadium, tungsten, chromium, and mercury had been mined, moved, stock-piled, and much of it milled and shipped to war industry plants. A certain road to vanadium deposits reduced travel time 300 percent and within 6 months the tonnage of ore delivered to reduction plants had been increased tenfold. New supplies of coal, iron, and timber were also tapped.

Status of grazing districts.—During the year 783 applications which involved action under sections 6, 7, 8, and 14 of the Taylor Grazing Act, the Five-Acre Lease and Homestead Act, and the Enlarged and Stockraising Homestead Acts were received. Eight hundred and twelve such cases were disposed of and 301 were pending on June 30. Six special motion-picture permits were granted, and permits to remove timber for domestic use were granted to 636 individuals. These authorized the removal of 62,000 fence posts and 5,500 cords of wood.

Despite the number of internal changes that took place in grazing districts during the year, there was no change in the gross area and but slight change in the total area administered by the Grazing Service. The statistical detail is shown on Table I.

Range development.—In modifying the program in the interests of war, no large range improvement projects were undertaken. Maintenance of existing improvements was stressed; all new structures were considered carefully before installation from the standpoint of increased meat production. Even small projects were postponed unless it was determined that they would contribute to more tons of livestock and its products, nor were projects undertaken if more than a nominal amount of critical materials was needed in their structure. It is estimated that through these activities 2 million acres of formerly

undeveloped grazing land were brought under economic use. Water development to facilitate range use and management, reseeding, maintenance of fences and trails to control and handle livestock, and control of predatory animals, rodents, insects, and poisonous plants, featured this part of the program. Fences and trails saved thousands of man-days of the producers' labor, an important factor in the solution of manpower shortages. Truck trails eliminating expensive stock drives enabled producers to put their livestock on the market faster and in better condition.

On table II are shown the major range improvements completed during the past year and the amount completed since the inception of this type of work in 1935.

Range protection.—Grazing districts are social and economic units occupied by 2 million persons who live on farms, ranches, and in towns, and who earn their livelihood from the land in the face of great odds. The chief range hazard is fire. Grass fires move fast requiring prompt attention. About 90 million acres in grazing districts are in high hazard zones. The danger to crops, buildings, forage, and watersheds is increasing because of more abundant grass on the Federal range and the intense activity, especially military. Many fires are caused by incendiarism or by carelessness. There is constant danger from fire on bombing practice ranges. Last year 1,128 range fires burned 1,734,992 acres in grazing districts, reducing precious tons of livestock feed to smoke and ashes. Seventy-seven percent of these fires were man-caused. Lightning-caused fires were largest and most destructive. To meet this situation every means of prevention and suppression is undertaken. The Grazing Service is steadily improving its fire-fighting technique through better communications, education, and cooperation. About 3,000 local per diem guards, who are paid only when called, are in active cooperation. Several dispatchers and lookouts, engaged during the fire season, are in close contact with field offices effectuating constant patrol in high hazard areas during periods of fire danger. Through cooperation with the Army within bombing areas, military ground crews are on the alert, equipped with tools and mobile units which enable them to get to a fire promptly. Trained fire bosses operate in each region under the general direction of a fire supervisor who is centrally located. Cooperation with States, agencies, and with the forest fire fighters service is effective and profitable.

Miscellaneous service.—The location of Army engineering units in Salt Lake City enabled the drafting office of the Grazing Service to contribute specialized work on the reproduction of plans for housing, airfields, sanitation, and other urgent military projects to

the extent of 37,500 square feet of process printing and 70,000 square feet of photocopy, at a great saving of time and money to the military.

Post-war planning.—The Six-Year Range Development Plan initiated 2 years ago was revised and enlarged to create a reservoir of useful work to help cushion the shock of sudden change from a wartime to a peacetime economy. This revised plan will enable the Grazing Service to implement work projects within 3 months after victory, which may employ 15 million man-days of labor on 50,000 small projects of 13 major types in 10 Western States. Distributed over 200 sparsely populated counties where small crews can be employed near their homes, the proposed plan will require largely common labor employed mainly on water development, erosion control, fencing, trail building, revegetation, and fire protection.

Preliminary studies have been completed in one State to integrate the Grazing Service plan with post-war State and Federal Works programs. Similar studies are now underway in 9 other Western States.

Hearings and appeals.—During the fiscal year 236 appeals from decisions of local administrators were filed, of which 103 were disposed of through local action. Ten decisions, after formal hearing, were appealed to the Secretary. These involved 41 grazing applications and licensees. One hundred thirty-three appeals were pending hearings at the close of the year.

Food for war.—Stockmen are thoroughly alive to their responsibility as producers of products for war, seeking every means to maintain production at a high level and to hold the conservation gains made during previous years. Labor difficulties and other conditions in certain localities caused a shift in livestock operations from sheep to cattle, but the grazing load on the Federal range was only slightly changed by this trend. Reports from permittees indicate a definite increase in weight and quality of animals marketed. Losses from predatory animals increased. More attention must be given to this problem.

As a part of the Secretary's "Food for War" program, the Grazing Service explored all possibilities in an effort to increase the amount of meat and wool for immediate and future needs. The methods adopted include better range management, reduction of death losses, harvest of surplus game animals, eradication of predatory animals, rodents, and poisonous plants; removal of useless horses, and increased grazing use wherever possible.

Rodent control was conducted on 1,726,300 acres; useless horses were removed to the extent of 25,273 head. Predatory animal control re-

sulted in saving about 3,000 calves and 85,000 sheep and lambs. Plans were laid to take 50,000 to 60,000 additional deer, elk, and antelope from grazing districts. This will account for an additional 5 million pounds of meat and will reduce winter death losses of game herds. Areas depleted by fire and other causes during the preceding years were reseeded to the extent of 166,292 acres.

Soil and moisture conservation.—This work, designed to benefit both public and private land, was carried forward under the President's Fourth Reorganization Plan on 51 projects initiated in previous years and on 11 projects initiated during the fiscal year 1943. Through this work large areas of range formerly underused or not used at all, were brought into beneficial and economic use, while congestion in other parts of the range was relieved to an equal extent.

Range surveys and studies.—Range surveys were completed on only 4,473,133 acres during the year, stress being given to other work more closely connected with war programs. Cooperative nutritional studies to encourage ranch fattening and better management of livestock were conducted in Oregon at the Squaw Butte Range Station and on selected areas in other States.

Federal Range Code.—The revised Federal Range Code, clarifying and simplifying administrative procedures dealing with the internal affairs of grazing districts, was approved by the Secretary September 23, 1942. The new code affords greater flexibility to meet widely varying conditions of the Federal range.

Trespass.—Steps were taken to eliminate from the range all useless and trespassing horses in conformance with the "Food for War" program and the Secretary's order of March 10, 1943. Stockmen are co-operating in gathering surplus horses prior to the effective date of the order. During the second half of the fiscal year out-shipments increased threefold over the same period of 1942. Sheep and cattle trespass increased slightly because of attractive livestock prices and an insufficient range-rider force.

Wildlife.—Big game in grazing districts increased approximately 13 percent over the previous year, totaling approximately 500,000 head. There was an increase in predatory animals, especially coyotes. To save vital food products and to reduce financial losses to the industry, advisory boards expended \$24,712.30 in 1943 for predator control in 14 grazing districts. A total of 47,194 predatory animals were eradicated during the fiscal year.

Utilization checks.—The system of utilization checks developed during previous years was maintained to check and record range use, and to guide the stockmen and administrators in the maintenance of

proper use on allotted ranges. A total of 12,367,233 acres was covered by such examinations during the year.

Licenses and permits.—The number of regular licensees and permittees increased from 21,249 to 22,019, a gain of 770, involving 10,777,-793 livestock of all classes. This represents a decrease of 190,343 head, but the grazing load was approximately the same as that of the previous year, due to the trend to fewer sheep and more cattle. The cattle numbers under licenses and permits increased 54,191 head, while the sheep decreased 201,084 head. The statistical detail is shown by States in Table III.

In addition, 1,655 temporary part-season War Emergency licenses were issued, involving 69,893 cattle; 3,888 horses; 197,314 sheep, and 150 goats; adding only 1.3 percent to the total grazing load while enabling owners to shape their plans for more meat production.

Ten-year term permits were issued to 4,490 operators during the year, bringing the total to 10,600, or about 50 percent of all users operating on a license basis a few years ago. Permits include definite range allotments which are agreed upon by all interested parties. This marks another forward step in the stabilization of the livestock industry.

TABLE I.—Status of grazing districts, approximate acreages as of June 30, 1943

State	Number of districts	Gross area	Vacant, unappropriated unreserved public land	Other public land	Total administered by Grazing Service	Other land •
Arizona.....	4	18,171,400	9,100,688	819,879	9,920,567	8,230,833
California.....	2	8,050,300	2,867,545	812,399	3,679,944	4,370,356
Colorado.....	8	15,903,700	7,192,858	643,601	7,836,459	8,067,241
Idaho.....	5	21,867,600	10,968,690	762,290	11,760,899	10,106,701
Montana.....	6	31,938,700	4,148,375	923,800	5,072,175	26,896,525
Nevada.....	5	48,590,200	35,714,325	549,700	36,264,025	12,296,175
New Mexico.....	7	39,747,100	14,552,769	684,369	15,237,138	24,510,262
Oregon.....	7	20,346,500	12,255,341	157,763	12,413,104	7,933,396
Utah.....	9	37,487,800	23,552,444	2,143,828	25,696,272	11,791,528
Wyoming.....	5	22,506,100	12,938,929	1,096,320	14,035,258	8,470,842
Total.....	58	264,600,700	133,321,973	8,593,868	141,915,841	122,693,859

TABLE II.—Range improvement projects

Type of project	Unit	Completed fiscal year 1943	Total completed April 1935 to June 1943
Spring developments.....	Number.....	128	954
Reservoirs (stock water).....	do.....	275	2,070
Wells (stock water).....	do.....	70	369
Pipe and tile lines.....	Linear feet.....	6,030	282,165
Truck trails.....	Miles.....	650	9,916
Stock trails.....	do.....	54	1,314
Bridges (over 10-foot span).....	Number.....	9	331
Fences.....	Miles.....	530	5,945
Corrals.....	Number.....	21	392
Rodent control.....	Acres.....	751,865	12,221,856
Insect pest control.....	do.....	186,820	656,332
Range revegetation (seeding).....	do.....	166,292	514,338
Check dams (permanent).....	Number.....		8,141
Check dams (temporary).....	do.....		49,873
Tree plantings (gully).....	Square yards.....		11,580
Channel construction.....	Linear feet.....		27,973
Water spreaders.....	do.....		179,915
Riprap and paving.....	Square yards.....		153,128

TABLE III.—The following table contains the statistical detail pertaining to permitted livestock on the Federal ranges for the fiscal year 1943

Region	Number licensed operators	Number of cattle	Number of horses	Number of sheep	Number of goats	Total livestock
Arizona.....	615	82,236	2,763	109,130	24,625	217,754
Colorado.....	2,343	179,907	5,782	878,528	127	1,062,344
Idaho.....	3,327	186,098	18,142	1,258,717	55	1,463,019
Montana.....	3,100	197,491	24,890	1,056,321	56	1,278,758
Nevada-California.....	1,844	384,435	18,977	1,024,099	4,009	1,431,520
New Mexico.....	2,355	285,149	12,560	711,598	57,721	1,067,028
New Mexico No. 7.....	1,553	5,285	9,197	109,550	18,726	142,758
Oregon.....	1,506	206,686	14,501	402,320		623,507
Utah.....	3,787	175,605	9,274	1,535,129	5,615	1,725,623
Wyoming.....	1,589	161,545	13,160	1,590,534	250	1,765,489
Total.....	22,019	1,864,437	129,246	8,672,926	111,184	10,777,793

National Park Service

NEWTON B. DRURY, Director

THE reduced wartime staff of the National Park Service is engaged in the task of making definite contributions to the war program, and at the same time continuing to protect the irreplaceable cultural resources conserved within the national parks and monuments. Thoughts of America's future after the war may well be associated with the basic purpose of the National Park Service, which by mandate of the Congress is to "conserve the scenery and the natural and historic objects and the wildlife" in the areas it administers, and to provide for human enjoyment of them "in such manner and by such means as will leave them unimpaired for future generations." Justification for this purpose, which was well established before the Service was created in 1916, is found in the conviction that only by complete protection from commercial use or exploitation can these special areas fulfill their highest value to the Nation. They make up less than three-fourths of 1 percent of the land area of the United States.

To harmonize the Service's objectives with war uses of the areas for which it is trustee, the criteria cited in the 1942 annual report have been consistently applied. These tests involve the thought that inconvenience to park administration and to visitors, or remediable damage to park property, are not considered sufficient reason for denying uses of park facilities and resources that would not be considered appropriate under peacetime conditions. Only where proposed uses would do irreparable damage and entail destruction or impairment of distinctive features and qualities in the parks have the questions been raised: Have all reasonable alternatives been exhausted before invading the national park areas? Is the demand based upon critical necessity? The Service has cooperated to the full with war agencies in seeking the answers to these questions. The military authorities have shown full appreciation of the Service's position.

There are those who under the cloak of patriotism would reopen old issues as to the exploitation of lands which Congress and the American people have decreed should be held inviolate for the national good. But national park lands and policies have so far been fully protected from the activities of those who might, designedly or unconsciously, attempt to use the war as an excuse to raid them.

The national parks and monuments are vital American institutions that have their proper place in our national life. They are a segment of the Federal estate that has been chosen for preservation so that this and future generations will see the untamed America that was, and understand the compelling influence that built and strengthened this Nation. We cannot lightly abandon them, or the idea that gave them being, although we may have to sacrifice both in part at least if compelled to do so by the needs of war.

The importance of the national park areas to our people is attested by the fact that during the year 8,228,220 visitors, of whom more than 1,655,720 were members of the armed forces, turned to them for inspiration and relaxation, and to gain deeper appreciation of this land of ours.

THREATS TO CONSERVATION

The necessity for forest products has intensified since last year's report. Particularly is this true in the Pacific Northwest where the supplies of Sitka spruce, the most suitable material for certain types of aircraft construction, are running short.

It appears evident that, if the war lasts several years, all of the readily available airplane spruce in Oregon and Washington will be exhausted. In that event, a more complete transition to the use of substitutes, or fuller use of more remote commercial stands of spruce, will have to be made. In view of the national importance of the last remnants of the once vast virgin spruce and fir forests of the Northwest, it may fairly be asked whether the alternatives should not be exhausted *before* rather than *after* the forests in Olympic National Park are destroyed and an outstanding natural spectacle lost to America forever.

Critical necessity rather than convenience should be the governing reason for the sacrifice of such an important part of the Federal estate. If Olympic National Park is opened to the logging of Sitka spruce to meet war needs for aircraft materials, there will exist great danger that pressure to widen this breach will be injected by local interests to maintain local industries after the war is over. That issue was considered by the Congress and definitely decided on a basis of national good when Olympic National Park was established.

There has been considerable agitation to cut the mature trees within national parks on a selective logging basis. The proponents of such action miss entirely the main point of national park philosophy, for they fail to realize that the removal of any portion of the forest under any system of logging, however restrictive, disrupts the balance of nature, and is contrary to the very principles upon which the national parks and monuments were established. Once logging is introduced into an area, it no longer exists as a superlative virgin forest.

With the greatly increased demand for lumber to meet war needs, the cutting of forests on private and national forest lands was intensified, so that responsibility for the preservation intact of representative areas of the magnificent virgin forests of this Nation rests more than ever upon the National Park Service. Of the once extensive forests that covered the continental United States, there still exist approximately 630,000,000 acres of forested land. Of that amount, approximately 1 percent is contained within the national parks and monuments. That is a small fraction to hold inviolate according to the national park pattern. Surely there is ample justification for the consensus among conservation leaders that the forests in the national parks should not be invaded, unless the trees are absolutely essential to the prosecution of the war with no reasonable alternative.

As proposals to mine certain critical minerals in the national parks and monuments have been received, the Service has taken the position that such invasion can be justified only when it would furnish materials indispensable to the war and not obtainable in sufficient quantities elsewhere. This policy has been taken into consideration by war production agencies in connection with studies made in the national park areas.

As was the case during World War I, growers of livestock urgently demanded grazing privileges in many of the areas of the National Park System. In order to answer these demands, a study was made of all areas throughout the system and increases in grazing allotments in certain types of areas were authorized as an emergency contribution to the food-production program. However, the study substantiated the basic policy that grazing is detrimental to the preservation of natural forest, meadow, and wildlife conditions, and that it should not be allowed in national parks and monuments of the "wilderness" type.

This study revealed that the total lands which are administered by the National Park Service and which are suitable for grazing constitute but one-seventh of 1 percent of the grazing lands in the United States—an infinitesimal amount when compared with the Nation's food supply. Other evidence clearly demonstrates that grazing is severely detrimental to the flora and fauna that are such important parts of the

balance of nature present in the national parks and monuments. Park properties subjected to grazing during the last war were damaged out of all proportion to the small increase in the food supply attained.

MILITARY USES

The Army and Navy have continued to use national park and monument lands for varied military purposes. On the part of military authorities there has been shown a spirit of cooperation and understanding of Service objectives and a recognition of the need for the preservation of natural and historic values. This was borne out in two important instances. At Joshua Tree National Monument, California, desert warfare training units extended a road across the Monument, and at Hawaii National Park extensive training and defense installations were made. When the damage to natural features was reviewed with Army authorities, immediate steps were taken to locate suitable alternative areas and to repair the damage. Practically all of the national park and monument areas along the Pacific, Atlantic, and Gulf Coasts, because of their strategic location, are being used for defense installations, such as the large number of aircraft warning service posts installed by the Army, or for training purposes. Yet no important park values are being destroyed, and in many cases military needs are being served in conjunction with park-protection activities.

The Navy Department, in June 1943, took over the Ahwahnee Hotel in Yosemite National Park, California, as a convalescent center. This unique hostelry is serving its highest purpose in wartime by furnishing an ideal environment in which members of our naval forces may regain their health.

The Eastman Hotel and Bathhouse at Hot Springs National Park, Arkansas, was purchased by the War Department for use as a hospital in connection with the Army and Navy Hospital.

All types of equipment for Arctic warfare were tested in advance of quantity production by the Army's Quartermaster Corps at Mount McKinley National Park, Alaska, because this was the only reasonably accessible place in North America which would afford Arctic conditions in summer. Various kinds of tests of equipment and clothing were also conducted at Shenandoah, Mount Rainier, and Yosemite National Parks.

The national historical parks, military parks, and historic sites of the East made their principal contributions to members of the armed forces as laboratories for the study of military activities. In the early stages of the development of the national military parks and battlefields following the War Between the States, the greatest care was

taken by Confederate and Union participants to mark carefully the movement of troops and to report accurately, without praise or censure, the events that took place on these battlegrounds.

A familiar sight during the past year has been the activity of officers from the Quantico Marine Base, Virginia, carrying on field studies of the First and Second Battles of Bull Run in Manassas National Battlefield Park; or troops from the A. P. Hill Reservation tracing the route of march of Stonewall Jackson on the battlefield of Chancellorsville.

A considerable portion of Petersburg National Military Park, Virginia, formerly a part of Camp Lee, was again returned to Army jurisdiction. Lands adjoining Fort Oglethorpe in the Chickamauga-Chat-tanooga National Military Park are serving as camps and training grounds for some members of the Women's Army Corps.

The engineering laboratory which had been engaged principally on testing materials for the Bureau of Yards and Docks, United States Navy, was lent in August 1942 to the U. S. Engineers. To facilitate their operations, all laboratory equipment was transferred to a temporary wooden building at one of the Army field stations. On December 25, 1942, this structure burned to the ground, completely destroying all of the laboratory equipment. The U. S. Engineers will replace the destroyed equipment after the war when specialized laboratory apparatus and equipment of this type are again manufactured.

Thousands of dollars worth of equipment were turned over to the armed forces by the National Park Service. A typical example is the snow-removal equipment, conservatively valued at \$150,000, which was made available to clear Army airfields of snow during the winter months.

With the spread of Army and Navy training centers throughout the Nation, the commanding officers and members of the armed forces have come in increasing numbers to the national parks and monuments. There were almost three times as many military visitors in the fiscal year 1943 as there were during 1942. Travel reports from 122 areas indicated approximately 1,650,000 members of the armed forces visited those areas in the fiscal year ending June 30, 1943.

Many Army bases in the West and Southwest combined recreation with training in convoy operation and preventive maintenance. Not only the driving of convoys over mountain roads, but also establishing of overnight bivouacs and field practice were beneficial, and far-reaching effects upon the mental attitude of these members of the armed forces resulted from their seeing some of the greatest aspects of the America that they are fighting to preserve.

The desert warfare training camps in Arizona and southern California organized maneuver-recreation trips to Grand Canyon National Park. There on the South Rim one of the former CCC camps was renovated and equipped to accommodate them. Mount Rainier and Olympic National Parks in the State of Washington were the "objectives" of many soldiers from Fort Lewis and other camps in that area, who had completed their training and were awaiting orders to be transferred to war zones, while Yosemite and Sequoia National Parks in California served thousands of nearby military personnel. Opportunities for such visits were made honor awards in many of the camps.

Mount McKinley National Park in Alaska is being enjoyed by the soldiers stationed in the northern battle zone. The McKinley Park Hotel, operated by The Alaska Railroad, was turned into a recreation center where soldiers are given vacations that afford some respite from the experiences of the battles they fought along the Aleutians.

There is significant justification of the national-park concept in the fact that increasing thousands of members of the armed forces are being given opportunities they never had before, and may never have again, to see the inspiring beauty and historical significance of this land of ours.

CONTRIBUTION TO WAR PRODUCTION

As the tempo of the United States' participation in the war increased, there came increasing demands upon the National Park Service for wartime use of the areas that the Service administers and of the resources that these acres contain.

During the fiscal year 448 such requests were received, and of these 403 were approved. The 45 which proposed operations that would have done material damage to natural or historic features were returned and alternatives were suggested that would meet military needs without destroying important park and monument objects.

Most of the war uses authorized were for facilities and areas formerly open to the public, and simply involved change in the type of use. For example, the main through roads in Yellowstone National Park, the Blue Ridge, Natchez Trace, and George Washington Memorial Parkways were opened to military trucking on a temporary emergency basis. Such direct damage to roads as may occur will be repaired when normal travel is resumed and trucking has been discontinued.

In order to cooperate to the fullest extent in relieving the shortage of tannin extract materials, dead chestnut extract wood on a portion

of the Blue Ridge Parkway was advertised for sale. The forests involved are not of virgin character and the future plans for parkway development provided for the removal of a part of this dead chestnut.

Upon the recommendation of the War Production Board, it was necessary, as a contribution to the war program, to permit the sale of some urgently needed Sitka spruce and Douglas fir within the Queets Corridor, between Olympic National Park and the Pacific Ocean, which had been acquired for parkway purposes. The timber to be removed, amounting to approximately 4,000,000 board feet, was marked with great care on a selective basis so as to leave a forest canopy. Immediately along the prospective parkway the forest was left practically untouched. The lands within the Queets Corridor are not a part of Olympic National Park and, therefore, are not protected by the prohibition against commercial logging which applies to national park lands. It is recognized, however, that even this selective logging along the Queets Corridor entails a sacrifice of primeval forest conditions and future parkway values in the interest of the war.

To meet the need for war purposes of minerals that are becoming critically scarce, it has been necessary to make certain departures from national park policy. As a contribution to war production, the Defense Plant Corporation, a Government agency, was authorized to extract salt from Death Valley National Monument, California, to meet immediate requirements for scheduled operations at the Basic Magnesium Plant near Las Vegas, Nev. Between June 2 and July 31, 1942, more than 15,000 tons of salt were removed from the monument. Meanwhile, investigations of other sources proved to be successful and brought to a close the operations within the monument. It will be many decades before nature can gradually soften the scars and restore the picturesque salt pinnacles that were destroyed by these operations.

A valuable deposit of tungsten within Yosemite National Park was mined by the Metals Reserve Co., a Government agency, upon recommendations of the Geological Survey, Bureau of Mines, and War Production Board that it was essential.

Army and Navy contractors removed approximately 130,000 tons of sand and gravel from Rialto Beach, Olympic Acquisition Area, Washington, and approximately 45,000 tons from Sitka National Monument, Alaska.

Permission to build a short-cut road through a portion of Mount McKinley National Park, Alaska, was given to the owner of an antimony mine which will permit shipment of approximately 700 tons of crude ore and concentrates during the summer of 1943.

Operators of manganese mines adjacent to the boundary of Olympic National Park were permitted the use of park lands for building low-standard truck trails to reach nearby existing highways. In order to facilitate production of important minerals at Death Valley National Monument, four access roads across monument lands were constructed to sources of manganese, lead, tungsten, and talc.

To help in some degree to meet the critical need for food and fiber during the war period, increases from approximately 20,000 head of cattle to 25,000 head, and from 74,000 sheep to 82,600 sheep were authorized on certain national monuments, recreational demonstration areas, and historical areas. There was no increase in the major national parks. A small amount of grazing still exists in 10 national parks and a considerable amount in 33 national monuments and other areas. In approving this wartime step, the Secretary of the Interior reaffirmed the long-established policy of gradual decrease and ultimate elimination of grazing in national parks and monuments.

An incidental contribution to the Nation's meat supply was made through the necessary reduction of the northern elk herd of Yellowstone National Park. Disposal of Government-killed elk (691 animals) was made to 11 Indian agencies and to the Montana Fish and Game Commission in accordance with arrangements which were made to have the meat used for domestic consumption. Hunters outside of the park killed 7,230 elk. It is estimated that the elk-reduction program resulted in 1,789,000 pounds of meat being made available for human use.

The Yorktown Historical Museum in Colonial National Historical Park was remodeled into a post office to help meet the needs of the greatly increased population in that wartime center. The administration and museum building of Boulder Dam National Recreational Area was turned over to the Bureau of Reclamation and municipal authorities to remodel into a hospital for the workers in war plants in and surrounding Boulder City, Nev.

About 8½ million pounds of scrap metal, mostly iron and steel, were collected in the areas administered by the Service and contributed to the scrap metal drive. At the same time, following request of the War Production Board, a survey was made of the nonferrous metal contained in the statues, historical cannon, and other mementoes. It was learned that there was a total of about 985 tons of nonferrous objects of all sorts in the national parks. While this was done to assist the War Production Board in calculating the potential war resources of the Nation, the National Park Service took care to point out that these historic objects and memorials are part of our national heritage which should be preserved inviolate until all other sources of scrap

metal have been exhausted. The Salvage Division of the War Production Board acceded to this view, as did the Office of the Chief of Ordnance, and it was agreed that cannon antedating 1865 and other historic objects should not be scrapped. Indeed, the Office of the Chief of Ordnance displayed willingness to save from the scrap pile such historic cannon as might come into their possession. As a result, the National Park Service was able to secure from the War Department a number of Burgoyne cannon for Saratoga National Historical Park, New York, and a fine old cannon for Castillo de San Marcos National Monument, Florida.

Lands which form a part of the National Capital Parks in the District of Columbia provided sites for defense installations and for the buildings required to provide working space for the thousands of men and women engaged in war duties in the Nation's Capital. The lands involved have an appraised value of \$24,300,000. The cost to the Federal Government of purchasing alternative sites would undoubtedly have exceeded that amount. While the withdrawal of these lands curtailed the amount of open space in downtown Washington and the recreational opportunities so important in an overcrowded city, such uses were held to be inescapable. Associate Director Arthur E. Demaray, as the liaison officer in Washington, D. C., has performed important public service in connection with this problem. It is the hope of those who have worked to make Washington the most beautiful capital in the world that all temporary structures will be removed at the end of the war much more rapidly than was the case with their predecessors of World War I.

The use of National Park Service areas and facilities, the expert services frequently provided by its administrative, technical, and construction staff, and the occasional use of minerals and other natural resources, are estimated to amount in value to date to more than \$30,000,000.

TRAVEL

The critical condition of the Nation's transportation systems, the drastic shortage of rubber, and the lack of gasoline and oil for other than essential civilian consumption, have called for discouragement, rather than encouragement, of civilian travel. All motor transportation engaged in sightseeing services in the national parks was stopped. Motor bus trips not absolutely essential were eliminated and many of the busses were transferred to war work. Only direct bus service between rail and bus terminals and accommodations within the parks was allowed by the Office of Defense Transportation. This authorized

service was used by many thousands of visitors in July, August, and September 1942.

By June 1943, the travel situation had become so critical that even the reduced hotel and transportation services were discontinued in many places. Railroads were unable to put on special supplemental trains, and all reduced summer rates as an incentive to vacation travel were eliminated. Only through trains were operated and, with connecting bus service curtailed or discontinued, there were drastic reductions in the number of civilian visitors to the national parks. There were practically no winter visitors to Mount Rainier, Crater Lake, and Lassen Volcanic National Parks, because snow removal equipment had been loaned to the Army Air Forces and the roads were not kept free of snow.

Travel to the national parks as a whole has not stopped, however, nor were they closed to visitors. Services and accommodations were adapted to the varying needs as they developed under rapidly changing conditions. Concessioners under contract with the Department continued to furnish limited services to the public. It was necessary for the Department of the Interior to discourage civilian use of transportation resources involved in long-distance travel. Civilians not close by found it difficult or impossible to visit the parks.

National parks remote from centers of population, such as Acadia, Bryce Canyon, Crater Lake, Glacier, Grand Canyon, Grand Teton, Mesa Verde, Shenandoah, and Yellowstone, received less than 25 percent of their normal travel. The largest losses compared with the 5-year average were to Acadia, 98 percent, and to Shenandoah, 93 percent. The cumulative totals of travel to all of the national parks and monuments reflect a reduction of 50 percent in comparison with the 5-year average for the years 1938 to 1942.

In Hawaii National Park, the lifting of the restrictions on civilian travel resulted in a 20 percent increase above the normal number of visitors, with 386,185 people visiting the park during the past fiscal year. This is an indication of the advance planning that must be done now to take care of the large number of persons who will want to visit the national parks as soon as travel conditions permit.

The Statue of Liberty National Monument, New York, nearly attained its normal travel with a total of 320,750 visitors making the pilgrimage to this outstanding symbol of liberty. It was also the scene for patriotic rallies and services broadcast throughout the world.

Among the national parks there was a notable increase in the number of persons who came and stayed for their full vacation period. To Yosemite National Park, California, in June 1943, for example, came 17,195 persons who stayed for a total of 77,900 visitor-days. The average stay per visitor at this park has more than doubled since the

outbreak of war. Increased use of the public campgrounds was also reported from Lassen Volcanic National Park, California, and numerous other areas.

Notwithstanding the handicaps of traveling under wartime conditions, many thousands of persons were willing to take coach trains, use what gasoline they had for their automobiles, ride horseback, travel by wagon, propel a bicycle, or walk, in order to seek a few hours or days of relief from war tension in the environs of the national parks and monuments.

Park officials report that from July 1, 1942, to June 30, 1943, approximately 6,572,500 civilians in addition to 1,655,720 members of the armed forces visited the areas administered by the National Park Service. Thousands of workers transferring to war plants took advantage of opportunities to visit parks and monuments en route. Several areas did not report visitors because of lack of personnel to keep the necessary records or for reasons of military censorship, which in some degree is responsible for decrease in the total travel figures.

PROTECTION OF PARK FORESTS

Although the forests in the National Park System are not commercially available for production of the raw materials of war, nevertheless they are among the possessions that this Nation is perpetuating in order that future generations may know and appreciate in some measure the native, virgin forests which once covered a large portion of the United States. Their proper protection in wartime is a responsibility of first magnitude.

Forests cannot be set aside like inanimate objects. They are living entities, the elements of which are born, grow, mature, reproduce, and eventually die like all other living things. During this cycle they are subjected to all the hazards of nature. Against many of these elements man's efforts would be futile, but against fire, tree diseases, forest insects, the excessive inroads of man himself, the battle must go on if the national park forests are to be preserved "for the benefit and enjoyment of the people."

To the normal problem of fire protection, an acute threat of sabotage and enemy incendiaryism was added. This, and the withdrawal of many trained fire fighters from the forest, necessitated intensification of training, keener analysis of fire problems, and a thorough revitalization of the fire protection organization.

In recognition of extreme fire hazard, areas within 300 miles of the coast were included within the allocations of national defense funds for fire protection of forests, forest industries, and strategic facilities.

Five Civilian Public Service camps, consisting of approximately 100 men each, were assigned to work primarily on white pine blister rust control, but were available for fire suppression. They were located at Shenandoah, Great Smoky Mountains, Glacier and Sequoia National Parks, and the Blue Ridge Parkway.

During the year, there were 402 forest fires affecting national park areas, a decrease from the previous year of 25 percent. The total area inside the National Park System burned during 1942 was 4,415 acres, a decrease of 85 percent from the previous year. This included 3,224 acres of forest, 512 acres of brush, and 679 acres of grass. Over 25 percent of the total acreage burned resulted from a series of lightning fires in Yellowstone National Park.

Credit for the 23 percent decrease in the number of man-caused fires, and the relatively small acreage burned, is attributable to the intensive fire prevention campaign which has been waged and to the fire training programs.

Recent studies of past fire causes revealed that the tourist was responsible for 47 percent of the total number of park man-caused fires, while 53 percent were caused by people who live or work in or near the parks. Fire-prevention efforts, therefore, were directed to a greater degree toward this class of person than heretofore.

The forest insect situation in the National Park System was generally favorable as a result of previous intensive control programs. A small amount of maintenance control operations held most insect infestations in check. Continuing vigilance and prompt control of minor outbreaks are required to forestall epidemics such as those which have swept over vast forest areas in the past.

White pine blister rust, a serious exotic disease, which attacks the eastern and western white pines, including the magnificent sugar pine of the West, has continued to spread. Approximately 382,740 acres of pine forest in the national parks warrant intensive control work. The intensified control program, initiated last year by the appropriation of special funds, was carried forward in 1942 with an additional 9,660 acres added to the previous 262,740 acres which have received initial control. The Bureau of Entomology and Plant Quarantine of the United States Department of Agriculture furnished excellent co-operation and technical assistance in carrying out this program in the parks.

PROTECTION OF WILDLIFE

Basic wildlife studies have been continued on a limited scale by service personnel. The loss of Civilian Conservation Corps wildlife technicians, curtailment of regular personnel, and reductions in funds

greatly restricted the research and advisory work done by the Fish and Wildlife Service in the National Park System, but cooperative relationships with that bureau were continued by the small staff of experts in its section on National Park Wildlife.

Thirty-three projects were undertaken during the year, including investigations of range limitations, boundary surveys based on ecological considerations, wildlife-cattle relationships, management plans for reduction of bison, elk, and deer in certain areas, field surveys in connection with plans for reintroduction of antelope, beaver, and other members of the native fauna of some parks and monuments, bear-visitor studies, and predator-prey investigations.

The long-planned reduction of the northern herd of Yellowstone elk was initiated in the fall of 1942. Experience indicated that live-trapping and removal would not solve the problem, primarily because available ranges outside of the park appeared to be fully stocked with elk. Satisfactory results were achieved through a combination of slaughter within the park, and adjustment by the State authorities of the hunting season outside the park. By January 14, 1943, when the Montana hunting season was closed, 7,230 elk had been eliminated from the northern herd, 691 of which were killed by park rangers within the park. This was the first systematic program carried out in a national park to effect a large-scale reduction of surplus animals. Its purpose was to bring the northern herd in Yellowstone National Park within the limits of the winter food supply and to save the herd from starvation. A census taken at the close of the reduction program showed that more than 8,000 elk remain in the northern herd. Range studies indicate that not more than 7,000 elk in addition to other grazing and browsing animals can be supported by the forage available.

Bears were live-trapped and taken to remote sections of Yellowstone, Yosemite, Glacier, Mount Rainier, Crater Lake, and Sequoia National Parks to remove them from areas of intensive human use. Artificial feeding of bears was stopped in order to remove the inducement to bears to concentrate in specific areas and to induce them to return to normal methods of foraging. Efforts were made to impress the public with the necessity of treating bears as wild animals. One person died after being injured by a bear at Yellowstone National Park. Although there have been many serious injuries to visitors at the park, this is the first and only instance in which a fatality has ensued.

In order to control the increasing population of bears, and to eliminate those which are dangerous to human beings, 87 of these animals were disposed of by park rangers in Yellowstone, Yosemite, and Crater Lake National Parks. The number of bears in the national parks and monuments is estimated at 2,544 black bears and 510 grizzly bears.

ADDITIONS TO NATIONAL PARK SYSTEM

Jackson Hole National Monument, Wyoming.—This monument was established by Presidential proclamation on March 15, 1943, thus bringing to a head a program that was initiated in Wyoming almost 20 years ago. Grand Teton National Park, established by the Congress in 1929, and Jackson Hole, which adjoins it to the east, have long been famous for their majestic scenery. The two areas bear as close a relationship to each other as do the cliffs and valley floor of Yosemite National Park. The preservation of this great landscape as a national treasure, a place which better than any other symbolizes the fur trading and pioneering eras in America's history, an area wherein earth-building processes are displayed in spectacular form, and as an outstanding nature sanctuary, had been urged as a project of importance to the Nation for half a century.

The so-called "Jackson Hole Plan" was originally sponsored by local, State, and Federal interests as a means of realizing the benefits to the Nation of perpetuating the significant characteristics of this area for the enjoyment of this and future generations. Nearly 15 years ago, Mr. John D. Rockefeller, Jr., became interested in the "Plan" and volunteered to purchase portions of the area for national park purposes. This year, after having invested over \$1,500,000 in the project, and having waited 15 years for his gift to be accepted, Mr. Rockefeller requested that conclusive action be taken. As 76.9 percent of the land was in public ownership and 15.2 percent was owned by Mr. Rockefeller, a combined total of 92.1 percent, the President's Proclamation establishing the national monument assured protection and unified administration of the major part of the area. The proclamation protects all valid existing rights on the 7.9 percent of lands in private ownership. By an administrative order, the Secretary of the Interior continued certain privileges previously enjoyed by the local people on Federal lands and has given assurance that all private rights will be protected.

Nevertheless, there developed misconceptions that people would be deprived of their homes and livestock enterprises, that Teton County would be ruined because of loss of taxes, and that other economic changes to the detriment of the community would result. As a consequence, House Resolution No. 2241 was introduced by Congressman Frank A. Barrett of Wyoming calling for the abolishment of Jackson Hole National Monument. Hearings were held on the bill by the House Public Lands Committee in Washington and, during the summer recess, members of the committee plan to make joint investigations

in Wyoming with members of the Senate Committee on Public Lands and Surveys.

Thomas Jefferson National Memorial, Washington, D. C.—The Thomas Jefferson National Memorial, at the Tidal Basin in Washington, was dedicated by President Roosevelt on April 13, 1943, the two hundredth anniversary of Jefferson's birth; thus rededicating the Nation to the ideals of this great exponent of our democratic faith in political and religious freedom, educational advancement, and opposition to every form of tyranny over the human mind.

The memorial building derives its inspiration from the Pantheon at Rome, which so fired the enthusiasm of Jefferson that he used it as the model for the Rotunda of the University of Virginia. In the center is the model for the statue of Jefferson by Rudolph Evans which will be completed after the war.

Independence Hall National Historic Site, Philadelphia, Pa.—By cooperative agreement with the city of Philadelphia, Independence Hall was designated as a national historic site by the Secretary of the Interior on May 14, 1943. The Declaration of Independence was adopted by the Continental Congress in Independence Hall. It was also the meeting place of that Congress and of the Constitutional Convention of 1787, and the seat of Government of the United States during the American Revolution and during the period of 1790–1800.

Olympic National Park, Washington.—At the request of the people of Port Angeles, Wash., and local officials, 20,600 acres, known as the "Morse Creek Watershed," were added to the park by Presidential Proclamation of May 29, 1943. The area includes Mount Angeles, a beautiful lake of the same name, fine old growth of Douglas fir, and the Webster gardens.

Hawaii National Park addition.—The Territorial Legislature of Hawaii adopted a resolution on February 27, 1943, directing the Commissioner of Public Lands to acquire 10,511 acres by purchase or condemnation for addition to Hawaii National Park, as authorized by act of June 30, 1938, and provided \$15,000 for the acquisition.

Lands acquired.—Although no new land acquisition projects were authorized during the year, 3,188 acres were acquired as a result of projects under way, 868 acres were donated, and 190,903 acres were transferred from other Federal agencies, as shown in the following table:

Lands acquired for the National Park System, July 1, 1942, to June 30, 1943

	Acquired by	Funds expended		Acres	Total Federal lands in area (acres)
		Federal funds	Donated funds		
Antietam National Battlefield Site, Maryland.	Donation.	-----	-----	1.00	51.73
Blue Ridge Parkway, Virginia-North Carolina.	do.	-----	-----	473.96	36,045.17
Capitol Reef National Monument, Utah.	Purchase.	\$1,800.00	66.00	-----	33,068.74
Great Smoky Mountains National Park, Tennessee-North Carolina.	do.	100,943.11	2,744.50	-----	462,355.10
Jackson Hole National Monument, Wyoming.	Transfer	-----	\$100.00	170,308.00	170,308.00
Kennesaw Mountain National Battlefield Park, Georgia.	Purchase.	17,263.10	280.79	-----	3,094.21
Mammoth Cave National Park, Kentucky.	do.	-----	15,675.00	377.45	50,353.83
Olympic National Park, Washington.	Donation.	-----	3.63	20,600.00	845,991.92
Saratoga National Historical Park, New York.	Transfer	-----	-----	11.70	-----
Additional disbursements in 1943 for lands acquired previously.	Donation.	5,400.00	96.35	-----	-----
	Purchase.	9,201.80	-----	-----	1,535.90
Total		134,608.01	15,775.00	194,963.94	1,602,790.60
Lands in Federal ownership in other areas.					19,763,564.84
Less acreage in Petersburg National Military Park transferred to War Department pursuant to the act of June 5, 1942 (56 Stat. 332)					21,366,355.44
					738.75
Non-Federal lands within authorized boundaries					21,365,616.69
					770,677.31
Acreage within maximum boundaries					22,136,294.00

Other Accessions.—Important gifts of historical materials included a valuable collection of letters and the personal effects of Gen. George A. Custer and a collection of drawings, paintings, and photographs by the late William H. Jackson. His death at 99 brought to a close a life which had been devoted to an interpretation of the West. The sketches bequeathed to the National Park Service included some that were made in 1863 while he was soldier in the Union Army in Virginia, and others extending over a period of 79 years during which he recorded events and scenes along the Oregon Trail, early expeditions into the Yellowstone, and many other activities of the pioneer West. Plans are being developed to exhibit these significant historical items in a W. H. Jackson room in the museum at Scotts Bluff National Monument.

The Carnegie Institution of Washington donated to the National Park Service its second extensive gift of publications. They covered reports by the institution in the fields of ethnology, archeology, biology, geology, and history with a monetary value of \$1,500. The material was distributed to a score of field areas, the four regional offices, and the Director's Office.

NATIONAL PARK AND MONUMENT PROJECTS

Big Bend National Park Project, Texas.—Situated in the impressive Big Bend region of the Rio Grande River, from which the park takes its name, this area contains some of the most notable of all southwestern mountain, plains, and canyon scenes. From the Chisos peaks the landscape stretches south into Mexico (where the Mexican Government has an adjoining project). The park combines unusually significant exhibits of historic, prehistoric, physiographic, and biologic types, highly important in the interpretation of cultural America.

Unsurpassed in the park field was the achievement of the State of Texas in acquiring 476,972.10 acres of land for this project in one year's time, following the appropriation in 1941 of \$1,500,000 by the Texas legislature for that purpose. The land bought by the State with this fund, plus other State land in the project, brought the total of State holdings to 697,683.5 acres, only 15,236 acres short of the total of 712,919.5 within the approved park boundary. Plans for the acceptance of this area as a national park will be completed as soon as the deeds have been perfected. The Congress included funds for the administration and protection of the park in the 1944 Interior Appropriation Act.

Cape Hatteras National Seashore Recreational Area Project, North Carolina.—A more interesting example of the beach type of ocean shore than this area cannot be found on the eastern coast. The raw, windblown sands driving upon the land from the sea, the rugged patches of trees and shrubs struggling to maintain existence, the miles of quiet marshland, the rich bird life and aquatic biology, the grand scale of the scene, its human history extending back to pre-Revolutionary times, its recreational attractiveness, and the rapid changes of expression brought on by alternations of calm and storm over this vast Atlantic wilderness, afford an opportunity to conserve a worthwhile and distinctive aspect of America.

Titles and options covering considerable land within this 62,000-acre project, which was authorized by the act of August 17, 1937, were acquired by the Cape Hatteras Seashore Commission. A plan of procedure was formulated between the State and Federal authorities to establish the area when a portion sufficient for practical administration has been acquired in one unit and deeded to the Federal Government. During the year the State enacted legislation which authorizes State funds for the purchase of land within the project.

Cumberland Gap National Historical Park Project, Kentucky, Tennessee, and Virginia.—The Cumberland Gap region is significant

principally in the story of early immigration, transportation and settlement in the midwest heart of America. Though much of its once wild and picturesque forests and streams have been modified by man's inroads, this historic spot still retains much of the atmosphere of adventure which prevailed when hunter, trapper, soldier, colonist, thief, and vagabond alike passed through the gap in the great pageant of our westward expansion.

Negotiations during the year with representatives of the three States concerned resulted in a general agreement in regard to a minimum project area of 6,000 acres to include the most significant historical features. The three States obtained the authority of Congress, by act of May 26, 1943 (amending the act of June 11, 1940), to enter into a compact to acquire the necessary properties and to transfer them to the Federal Government. With \$225,000 available among the three States for the project and with the authority of the Congress for an interstate compact, rapid progress is anticipated.

George Washington Carver National Monument Project, Missouri.—In accordance with an act passed by the Congress, the Moses Carver plantation, near Diamond, Mo., where the famous Negro scientist was born, was investigated by the National Park Service, to determine its significance as a national monument to commemorate the life's accomplishments of George Washington Carver in the advancement of human welfare.

Other projects—Efforts were continued during the year by the Governor of Florida to acquire sufficient land for the Everglades National Park Project.

An area on the American side of the International Boundary in the State of Arizona was selected for the Coronado International Memorial. Further progress awaits the acquisition by the Republic of Mexico of an adjoining area in the State of Sonora.

The Fort Frederica Association acquired most of the land needed for the establishment of Fort Frederica National Monument near Brunswick, Ga.

Richmond National Battlefield Park Project, Richmond, Va.—During the past year progress has been made by the State of Virginia toward the acquisition of approximately 700 acres of land on which are located the earthworks erected to defend the Confederate capital in the Peninsular Campaign of 1862 and in the battle of Cold Harbor in 1864.

PLANNING

Alaska Highway.—On January 8, 1943, the President authorized a survey of the lands adjoining the 310 miles of the Alaska Highway in

Alaska, and approved an allocation of \$50,000 from the highway fund for that purpose. The National Park Service was asked to undertake this study as a basis for protection of landscape and other values on the Government lands bordering the highway.

Public Land Order of July 20, 1942, withdrew from entry a strip of land 40 miles wide, 20 miles on each side of the line of the general route of the highway in Alaska, to provide military protection during the war and to allow time for the conduct of land use studies prior to settlement and development. The Canadian Government reserved a strip of land 2 miles wide along the 1,360 miles of the highway in Canada.

A staff of four National Park Service employees established headquarters in Juneau, Alaska, in June 1943. The study is expected to be completed by October 1944. Consideration will also be given to the lands adjoining the Richardson Highway and the cut-off from Tanana Crossing to Anchorage in Alaska. Other Federal agencies cooperating in the studies include the Fish and Wildlife Service, United States Army, Forest Service, Bureau of Mines, General Land Office, Geological Survey, and the Office of Indian Affairs. As far as the National Park Service is concerned, the aim of this study is to prevent this highway, which runs largely through public domain, from going the way of haphazard and unplanned development.

Drainage basins.—With funds allotted by the Bureau of Reclamation, a plan was completed for effective utilization of recreational opportunities created by the Columbia River Reclamation project at Grand Coulee Dam in the State of Washington. It was developed in cooperation with a committee of Federal, State, and local people.

On the Central Valley project in California, the National Park Service provided the leadership for a recreational study which is being planned with the assistance of a committee representing all State and local interests. A technical survey of the recreational resources of the Colorado River Basin was also begun.

Denison Dam and Reservoir Recreational Planning Project, Texas and Oklahoma.—Field investigations covering the recreational possibilities of the Denison Dam and Reservoir have been virtually completed. These include locations and plans for recreational developments, historic and archeological resources, and fish and wildlife resources, in which latter study the Fish and Wildlife Service cooperated.

Advance planning.—In anticipation of the economic changes from wartime to peace, the National Park Service has been asked to complete its project construction programs, which form a dependable list

of necessary and appropriate physical improvements, and roads and trails projects.

Judging from the experience after World War I, with the removal of transportation restrictions the pent-up urge to travel on the part of millions of people will result in tremendous increase in the number of park visitors. Adequate plans must be made to take care of them. Such considerations as the design and rotation of the use of campgrounds, the location and construction of new facilities, the routing of traffic so that all may benefit from visits to the areas with minimum damage to natural features and landscape beauty, and the reorganization and training of personnel, are essential phases of advance plans that should be considered now. While some work along these lines can be done with the present reduced technical staff, prior to the initiation of any general public works program, the Service must be provided with planning funds to make studies, surveys, and plans of the proposed projects.

RECREATIONAL DEMONSTRATION AREAS

The acceptance by the State of Oklahoma of the 2,228-acre Lake Murray Recreational Demonstration Area on February 20, 1943, marked the beginning of the process of transferring these areas from Federal to other jurisdictions as authorized by the act of June 6, 1942. Since that date, the task of effecting additional transfers has progressed as rapidly as the deeds could be prepared and submitted for approval. Sixteen recreational demonstration areas have been transferred, or approved for transfer to the States, one has been transferred to the Bureau of Reclamation, and nine have been added, in whole or in part, to the National Park System. Thus 26 out of a total of 46 recreational demonstration areas have been disposed of. Seven of the twenty areas remaining are being held for further study to determine whether they, or parts of them, should be given permanent status in the National Park System. They are Camden Hills, Maine; Hickory Run, Pa.; Catoclin, Md.; Fall Creek Falls and Shelby Forest, Tenn.; Custer, S. Dak.; and Roosevelt, N. Dak.

The 13 others in 7 States are still to be disposed of when the State or other public agencies, which are expected ultimately to take them over, are in a position to do so. The status of all 46 of these areas transferred to the States in recent years or added to the National Park System is shown in the tabulation on page 219.

ADVISORY BOARD

Because of war conditions, meetings of the entire Advisory Board on National Parks, Historic Sites, Buildings and Monuments were

not held, but an interim committee of four members met twice during the fiscal year 1943. The counsel of that committee has been helpful in meeting the demands for war production and military uses that would not destroy irreplaceable values in National Park Service areas. The members of the interim committee are Edmund H. Abrahams, chairman; Dr. Waldo G. Leland; Charles G. Sauers; and Richard Lieber. The other members of the Board include Dr. Clark Wissler, vice chairman; Dr. Frank H. Setzler, secretary; Dr. Thomas Barbour; Dr. Herbert E. Bolton; Mrs. Reau Folk; and Dr. Fiske Kimball. George de Benneville Keim, a member of the Board, died on July 9, 1943.

NATIONAL PARK CONCESSIONS, INC.

National Park Concessions, Inc., the nonprofit distributing corporation authorized by the Department of the Interior in 1941, was authorized to purchase and operate the concession facilities at Isle Royale National Park, Michigan, and at Vanderbilt Mansion National Historic Site, New York. The corporation also entered into a subagency agreement with the Lassen Park Co. to operate the concessions in Lassen Volcanic National Park for the duration of the war.

ADMINISTRATIVE ORGANIZATION

Because of the many curtailments caused by the war, efforts were made to strengthen the administrative organization of the National Park Service. Prior to this year, special appropriations for the Civilian Conservation Corps, Works Progress Administration, Public Works Administration, and other emergency agencies were available to perform essential Service functions. As they were discontinued, certain basic functions in the Director's Office, the regional offices, and the field offices were adversely affected. In collaboration with the Bureau of the Budget and the Appropriations Committees of the Congress, funds were provided to continue nucleus staffs of engineers, landscape architects, and historians in the Director's Office and in the four regional offices of the Service, thus putting important basic functions upon a permanent rather than a temporary basis.

Consolidated management of functions and activities is also being accomplished. The headquarters of the Southwestern National Monuments was consolidated with the Region Three Office at Santa Fe, N. Mex., and duties were reassigned so as to make for a reduction in the combined force.

Reducing the Service to a minimum basis has been a detailed and aggressive program. Each function has been analyzed as to its need

in wartime. Activities such as the United States Travel Bureau, the Historic Sites Survey, the Historic American Buildings Survey, and land acquisition, with the exception of completing authorized projects, were discontinued. Construction of major roads, trails, parkways, buildings and utilities was stopped. Equipment not necessary to vital park and monument protection was transferred to war agencies.

The problem of maintenance assumed major proportions during the year. Drastic shortages in the number of workers was caused by the withdrawal and diversion of manpower to the armed forces and war industries. The abolishment of the Civilian Conservation Corps withdrew maintenance services conservatively valued at \$1,000,000 annually. Many areas depended upon the CCC for practically all of their maintenance work. The shortage of personnel, together with the lack of many necessary supplies and replacement items, increased the work of the small maintenance organization that was available.

Unfortunately, storms further increased the work of the maintenance staff. During January 1943, severe storms in the West caused considerable damage in Mount Rainier, Yosemite, Sequoia, and Zion National Parks, and in Oregon Caves and Death Valley National Monuments. Hundreds of trees fell across roads, trails, and telephone and power lines; sewer lines were washed out; bridges and culverts were damaged; and rock and earth slides blocked many roads and trails. Flash floods and ice storms in the East damaged thousands of ornamental and historic trees, roads and bridges in the battlefields, monuments, and cemeteries in Virginia. Without remedial action, requiring the immediate attention of experienced engineers, landscape architects, foresters, and historians, the usefulness of these areas to the Nation would have been greatly depreciated.

The transfer of the Director's Office from Washington, D. C., to Chicago, Ill., caused a disruption of work for 2 months during August and September 1942. As the year progressed, the difficulties of operating the central office at a base far removed from the Department, the Congress, the Bureau of the Budget, and the loss of cooperative advice and counsel from other Federal agencies and conservation organizations located at the seat of Government were increasingly evident. Experience of the past year has amply demonstrated that for efficient and economical operation, the Director's office (as distinguished from the regional and field offices), should be returned to Washington, D. C., as soon as possible after the close of the war.

PERSONNEL

The reduction in permanent full-time positions from 4,510 on June 30, 1942, to 1,974 on June 30, 1943, including 121 "working fund"

positions, was made with few of the personal inconveniences that would ordinarily result from such a reduction. During the fiscal year, 334 employees of the Service joined the armed forces, bringing the total to over 600. Also, approximately 500 employees transferred to war agencies. No seasonal ranger-naturalists were employed during the 1943 travel season, and seasonal ranger positions not necessary to protection of the parks and monuments were not filled. Women park rangers and fire lookouts were employed for the summer season in several areas.

The Service is proud of its personnel. Those who entered the armed forces are serving at battlefronts throughout the world. Those who remained on duty did a creditable job of defending Service principles and protecting national park properties. The fact that with reduced funds all of the special war uses recounted in this report were handled efficiently and effectively, while at the same time those fortunate to be able to visit the parks, including increasing numbers of our military forces, were taken care of, is ample evidence of the loyalty of our workers to the institution that they serve.

Under conditions of total war the concept of conservation represented by the national parks has faced the most critical challenge in its history. Statement and restatement of purposes and responsibilities of the Service's trusteeship had to be made. Some sacrifices in the common cause were necessary, and more may be inevitable. But it is believed that we can emerge with the basic idea intact that the national parks and monuments must be protected as symbols of the greatness of this Nation.

Recreational demonstration areas

Area	State	Acreage	Disposition	Visitors ¹
Acadia.....	Maine.....	5,660	Added to Acadia National Park, June 6, 1942.	.....
Alexander H. Stephens Badlands.....	Georgia..... South Dakota.....	938	Added to Badlands National Monument, June 26, 1936.	11,700
Beach Pond.....	Rhode Island.....	3,472	Transferred to State, June 28, 1943.	11,633
Bear Brook.....	New Hampshire.....	6,155	Transferred to State, May 12, 1943.	12,130
Blue Knob.....	Pennsylvania.....	5,136	.....	8,890
Blue Ridge (2 areas).....	Virginia-North Carolina.....	10,585	Added to Blue Ridge Parkway, June 30, 1936.	.....
Bull Run.....	Virginia.....	1,605	Designated as Manassas National Battlefield Park, June 10, 1939.	.....
Camden Hills.....	Maine.....	4,962	.....	7,219
Catoctin.....	Maryland.....	9,746	.....	2,200
Cheraw.....	South Carolina.....	6,832	Under lease to State ².	.....
Chopawamsic.....	Virginia.....	14,060	Added to National Capital Park System, August 13 1940.	.....
Crabtree Creek.....	North Carolina.....	4,983	Transferred to State, April 6, 1943.	27,950
Cuivre River.....	Missouri.....	5,802	.....	10,748
Custer.....	South Dakota.....	20,167	.....	.....
Fall Creek Falls.....	Tennessee.....	15,776	.....	2,313
French Creek.....	Pennsylvania.....	6,198	(¹).....	.....
Hard Labor Creek.....	Georgia.....	5,802	.....	22,460
Hickory Run.....	Pennsylvania.....	12,908	.....	8,600
Kings Mountain.....	South Carolina.....	10,147	(¹) (⁴).....	.....

See footnotes at end of table.

Recreational demonstration areas—Continued

Area	State	Acreage	Disposition	Visitors ¹
Lake Guernsey.....	Wyoming.....	1,753	Transferred to Bureau of Reclamation, June 8, 1943.	.....
Lake Murray.....	Oklahoma.....	2,228	Transferred to State, Feb. 20, 1943.	3,339
Lake of the Ozarks.....	Missouri.....	16,037	.....	18,560
Laurel Hill.....	Pennsylvania.....	4,025	.....	17,025
Mendocino Woodlands.....	California.....	5,419	.....	4,948
Montgomery Bell.....	Tennessee.....	3,744	Transferred to State, June 9, 1943.	17,760
Montserrat.....	Missouri.....	3,439	.....	16,696
Oak Mountain.....	Alabama.....	7,805	Transferred to State, Apr. 30, 1943.	4,370
Otter Creek.....	Kentucky.....	2,435	.....	11,821
Pere Marquette.....	Illinois.....	2,522	Transferred to State, May 7, 1943.	3,895
Pine Mountain.....	Georgia.....	3,018	.....	4,595
Raccoon Creek.....	Pennsylvania.....	5,034	.....	9,620
Roosevelt.....	North Dakota.....	69,365	.....	14,335
St. Croix.....	Minnesota.....	18,499	(?).....	9,904
Shelby Forest.....	Tennessee.....	12,305	.....	45,600
Shenandoah.....	Virginia.....	10,129	Added to Shenandoah National Park, June 6, 1942.	.....
Silver Creek.....	Oregon.....	4,088	.....	18,458
Swift Creek.....	Virginia.....	7,610	.....	43,668
Versailles.....	Indiana.....	5,371	Transferred to State, Apr. 20, 1943.	9,107
Waysides (6 areas).....	South Carolina.....	239	.....	.....
Do.....	Virginia.....	206	Transferred to State, Mar. 26, 1943.	.....
Waterloo.....	Michigan.....	12,018	Transferred to State, June 15, 1943.	10,677
Winamac.....	Indiana.....	6,233	Transferred to State, Apr. 20, 1943.	13,260
White Sands.....	New Mexico.....	1,719	Added to White Sands National Monument, June 6, 1942.	.....
Yankee Springs.....	Michigan.....	4,197	Transferred to State, June 15, 1943.	43,882
Total.....	.....	360,392	.....	448,581

¹ Attendance figures shown for areas transferred to other agencies include visitors through the month in which the transfer was effected.

² Transfer to State approved by President and awaiting State acceptance.

³ 214 acres established as Hopewell Village National Historic Site, Aug. 3, 1938. Remaining 5,984 acres added to site, June 6, 1942.

⁴ 3,972 acres added to Kings Mountain National Military Park, July 11, 1940. Remaining 6,175 acres under lease to the State.

National Park System, acreage, and number of visitors

Areas (classification)	Location (State)	Approximate acreage maximum boundaries	Approximate visitors, fiscal year July 1, 1942-June 30, 1943	Approximate visitors, 5-year average, 1939-43.
National Parks				
Acadia.....	Maine.....	24,629	9,680	390,555
Bryce Canyon.....	Utah.....	35,980	19,600	106,015
Carlsbad Caverns.....	New Mexico.....	49,568	107,365	239,890
Crater Lake.....	Oregon.....	160,334	61,410	267,785
Glacier.....	Montana.....	984,310	53,925	176,015
Grand Canyon.....	Arizona.....	645,120	101,645	375,190
Grand Teton.....	Wyoming.....	96,000	30,100	112,500
Great Smoky Mountains.....	North Carolina-Tennessee.....	462,385	604,065	1,078,525
Hawaii.....	Hawaii.....	173,399	386,680	289,610
Hot Springs.....	Arkansas.....	1,011	179,455	202,050
Isle Royale.....	Michigan.....	133,839	6,159	17,385
Kings Canyon.....	California.....	454,600	87,135	177,080
Lassen Volcanic.....	do.....	104,527	40,250	105,795
Mammoth Cave.....	Kentucky.....	50,504	69,505	139,790
Mesa Verde.....	Colorado.....	51,334	10,365	87,580
Mount McKinley.....	Alaska.....	1,639,493	(?).....	1,310
Mount Rainier.....	Washington.....	241,782	245,020	428,135
Olympic.....	do.....	856,011	58,990	126,440
Platt.....	Oklahoma.....	.....	128,710	309,190
Rocky Mountain.....	Colorado.....	259,416	311,455	636,755
Sequoia.....	California.....	386,500	111,305	281,880
Shenandoah.....	Virginia.....	193,441	63,595	882,820
Wind Cave.....	South Dakota.....	12,640	8,415	19,790
Yellowstone.....	Wyoming, Montana, Idaho.....	2,212,773	146,155	535,770
Yosemite.....	California.....	761,111	228,725	522,185
Zion.....	Utah.....	86,343	58,680	167,960

See footnotes at end of table.

National Park System, acreage, and number of visitors—Continued

Areas (classification)	Location (State)	Approximate acreage maximum boundaries	Approx- imate visi- tors, fiscal year July 1, 1942-June 30, 1943	Approx- imate visi- tors, 5-year average, 1939-43.
National Historical Parks				
Abraham Lincoln	Kentucky	111	41, 100	110, 780
Chalmette	Louisiana	30	46, 630	31, 015
Colonial	Virginia	6, 793	220, 070	559, 800
Morristown	New Jersey	1, 051	98, 215	173, 395
National Monuments				
Ackia Battleground	Mississippi	49	(?)	(?)
Andrew Johnson	Tennessee	17	4, 390	13, 620
Appomattox Courthouse	Virginia	970	3, 925	13, 885
Arches	Utah	33, 680	960	2, 625
Artec Ruins	New Mexico	26	6, 100	12, 665
Badlands	South Dakota	150, 103	60, 950	220, 035
Bandelier	New Mexico	26, 026	4, 280	11, 555
Big Hole Battlefield	Montana	200	730	3, 865
Black Canyon of the Gunnison	Colorado	13, 969	6, 030	18, 120
Cabrillo	California	50	(?)	109, 040
Canyon de Chelly	Arizona	83, 840	845	2, 170
Capitol Reef	Utah	37, 126	1, 000	1, 530
Capulin Mountain	New Mexico	680	16, 700	35, 750
Casa Grande	Arizona	473	10, 735	16, 515
Castillo de San Marcos	Florida	19	128, 970	241, 100
Castle Pinckney	South Carolina	4	(?)	(?)
Cedar Breaks	Utah	6, 187	6, 840	16, 045
Chaco Canyon	New Mexico	21, 509	585	2, 415
Channel Islands	California	1, 120	(?)	(?)
Chiricahua	Arizona	10, 695	5, 470	9, 630
Colorado	Colorado	18, 311	8, 235	30, 960
Craters of the Moon	Idaho	48, 184	4, 485	17, 935
Death Valley	California-Nevada	1, 907, 720	24, 155	70, 040
Devil Postpile	California	800	6, 085	7, 430
Devils Tower	Wyoming	1, 153	9, 955	32, 290
Dinosaur	Utah-Colorado	203, 965	1, 850	8, 665
El Morro	New Mexico	240	455	1, 535
Father Millet Cross	New York	01	(?)	(?)
Fort Jefferson	Florida	87	2, 650	1, 385
Fort Laramie	Wyoming	214	2, 065	6, 390
Fort Mantanzas	Florida	18	1, 960	14, 755
Fort McHenry	Maryland	48	269, 120	515, 495
Fort Pulaski	Georgia	5, 427	(?)	138, 420
Fossil Cycad	South Dakota	320	(?)	(?)
George Washington Birthplace	Virginia	394	9, 925	43, 260
Gila Cliff Dwellings	New Mexico	160	140	190
Glacier Bay	Alaska	2, 299, 520	(?)	(?)
Gran Quivira	New Mexico	611	680	2, 555
Grand Canyon	Arizona	201, 291	115	1120
Great Sand Dunes	Colorado	46, 034	3, 740	11, 060
Holy Cross	do	1, 392	30	40
Homestead National Monument of America	Nebraska	161	455	11, 215
Hovenweep	Utah-Colorado	286	160	205
Jackson Hole	Wyoming	221, 610	(?)	(?)
Jewel Cave	South Dakota	1, 275	780	3, 805
Joshua Tree	California	837, 480	12, 375	14, 140
Katmai	Alaska	2, 697, 590	(?)	(?)
Lava Beds	California	45, 967	14, 080	32, 760
Lehman Caves	Nevada	610	1, 370	4, 295
Leitchfield Lewis	Tennessee	300	6, 285	18, 170
Montezuma Castle	Arizona	521	3, 330	8, 240
Mound City Group	Ohio	57	(?)	(?)
Muir Woods	California	425	91, 445	144, 370
Natural Bridges	Utah	2, 740	265	740
Navajo	Arizona	360	75	460
Ocmulgee	Georgia	683	28, 110	46, 535
Old Kasaan	Alaska	38	(?)	(?)
Oregon Caves	Oregon	480	19, 575	43, 200
Organ Pipe Cactus	Arizona	330, 687	42, 100	22, 500
Perry's Victory and International Peace Memorial	Ohio	14	41, 145	36, 815
Petrified Forest	Arizona	93, 199	49, 395	197, 530
Pinnacles	California	14, 498	5, 960	20, 000

See footnotes at end of table.

National Park System, acreage, and number of visitors—Continued

Areas (classification)	Location (State)	Approximate acreage maximum boundaries	Approx- imate visi- tors, fiscal year July 1, 1942-June 30, 1943	Approx- imate visi- tors, 5-year average, 1939-43.
National Monuments—Continued				
Pipe Spring.....	Arizona.....	40	5,090	2,535
Pipestone.....	Minnesota.....	118	1,035	1,425
Rainbow Bridge.....	Utah.....	160	70	200
Saguaro.....	Arizona.....	63,284	8,305	13,745
Santa Rosa Island.....	Florida.....	9,500	332,505	182,735
Scotts Bluff.....	Nebraska.....	3,476	41,650	83,375
Shoshone Cavern.....	Wyoming.....	212	(9)	(9)
Sitka.....	Alaska.....	57	5,540	7,150
Statue of Liberty.....	New York.....	10	820,755	442,570
Sunset Crater.....	Arizona.....	3,040	5,375	11,495
Timpanogos Cave.....	Utah.....	250	9,775	11,500
Tonto.....	Arizona.....	1,120	3,005	6,685
Tumacacori.....	do.....	10	5,135	9,655
Tuzigoot.....	do.....	43	4,120	17,400
Verendrye.....	North Dakota.....	253	2,000	4,950
Walnut Canyon.....	Arizona.....	1,879	6,990	12,490
Wheeler.....	Colorado.....	300	180	385
White Sands.....	New Mexico.....	144,946	42,815	68,315
Whitman.....	Washington.....	46	7,115	16,500
Wupatki.....	Arizona.....	35,813	900	3,365
Yucca House.....	Colorado.....	19	100	90
Zion.....	Utah.....	49,150	250	1,330
National Military Parks				
Chickamauga and Chattanooga.....	Georgia-Tennessee.....	8,551	135,825	361,000
Fort Donelson.....	Tennessee.....	103	8,655	31,540
Fredericksburg and Spotsylvania County Battlefields Memorial.....	Virginia.....	2,424	39,685	110,000
Gettysburg.....	Pennsylvania.....	2,425	75,745	557,785
Guilford Courthouse.....	North Carolina.....	149	4,850	31,130
Kings Mountain.....	South Carolina.....	4,012	8,985	22,090
Moores Creek.....	North Carolina.....	30	3,285	4,175
Petersburg.....	Virginia.....	1,398	135,030	269,085
Shiloh.....	Tennessee.....	3,717	75,195	233,400
Stones River.....	Tennessee.....	324	3,185	4,595
Vicksburg.....	Mississippi.....	1,338	9,655	187,675
National Battlefield Sites				
Antietam.....	Maryland.....	55	7,690	24,990
Brices Cross Roads.....	Mississippi.....	1	1,240	11,880
Cowpens.....	South Carolina.....	1	1,900	2,140
Fort Mifflin.....	Pennsylvania.....	2	31,215	69,435
Kennesaw Mountain.....	Georgia.....	60	11,950	13,025
Tupelo.....	Mississippi.....	1	6,090	6,300
White Plains.....	New York.....		(2)	(2)
National Historic Sites				
Atlanta Campaign Markers.....	Georgia.....	21	(9)	(9)
Federal Hall Memorial ¹	New York.....	49	110,195	176,615
Fort Raleigh ⁶	North Carolina.....	16	6,645	77,560
Gloria Dei (Old Swedes' Church) ⁷	Pennsylvania.....			
Hopewell Village ⁶	do.....	6,198	22,060	155,025
Independence Hall ⁷	do.....			
Jamestown Island ⁸	Virginia.....		(9)	(9)
Jefferson National Expansion Memorial ⁶	Missouri.....	77	28,055	(9)
Manassas National Battlefield Park ⁷	Virginia.....	1,605	12,330	18,380
McLoughlin Home ²	Oregon.....		11,120	(9)
Old Philadelphia Custom House ⁵	Pennsylvania.....	79	6,735	6,090
Salem Maritime ⁶	Massachusetts.....	9		
San Jose Mission ⁷	Texas.....		10,825	117,470
Vanderbilt Mansion ⁶	New York.....	212		
National Recreational Area				
Boulder Dam.....	Arizona-Nevada.....	1,939,808	268,310	668,455

See footnotes at end of table.

National Park System, acreage, and number of visitors—Continued

Areas (classification)	Location (State)	Approximate acreage maximum boundaries	Approx- imate visi- tors, fiscal year July 1, 1942-June 30, 1943	Approx- imate visi- tors, 6-year average, 1939-43,
National Memorials				
Blount Tablets	Tennessee		100	20
Where Lincoln Died	District of Columbia	.05	35,965	36,585
Devil Hill	North Carolina	314	8,965	70,470
Mansion	Virginia	.50	130,540	334,070
John Memorial	District of Columbia		572,645	1,331,225
John Museum	do	.18	60,235	60,940
Fort Rushmore	South Dakota	1,800	98,475	105,965
Echota Marker	Georgia	1		4,245
Thomas Jefferson Memorial	District of Columbia		362,930	172,585
Washington Monument	do		448,590	593,565
National Cemeteries				
Arlington	Maryland	11	900	180
Rockwood	District of Columbia	1	2,700	3,440
Manassas	Tennessee	136		
Gettysburg Battlefield	Montana	765	17,550	28,295
Donelson	Tennessee	15	(?)	(?)
Richmond	Virginia	12	(?)	(?)
Gettysburg	Pennsylvania	16	(?)	(?)
Fort Monroe	Virginia	9	(?)	(?)
John	Tennessee	10	(?)	(?)
James River	do	20	(?)	(?)
Gettysburg	Mississippi	120	(?)	(?)
Gettysburg	Virginia	3	(?)	(?)
Antietam	District of Columbia	11 25,570	(?)	(?)
National Capital Parks				
Parkways				
Blue Ridge	Virginia-North Caro- lina	34,770	187,890	521,525
George Washington Memorial	District of Columbia- Virginia	2,366	(?)	(?)
Jefferson Trace	Mississippi, Alabama, and Tennessee	12,834	(?)	(?)
Projects				
Adirondack National Historical Park ¹²	New York	2,594	8,215	124,245
Antietam Mountain National Military Park ¹²	Georgia	3,094	(?)	(?)
Grand total		22,136,294	13 8,228,220	17,767,920

Travel figures available for less than 5 years.

Travel figures not available or maintained.

Closed to visitors.

Established by Presidential Proclamation, Mar. 15, 1943.

Federally owned; operated by cooperating private agency.

Federally owned and operated.

Nonfederally owned and operated.

Federally and privately owned and operated.

Included in travel figures for adjacent battlefield site, military park, or historical park.

Travel included under memorials.

Includes Choptank Area, Virginia, and C. & O. Canal, Md.

Administered by Service pending final establishment.

Includes 1,655,720 military visitors.

Fish and Wildlife Service¹

IRA N. GABRIELSON, Director

THE Fish and Wildlife Service is the custodian of a rich natural resource which contributes to the specialized wartime demands of the Nation as well as to the continuing needs of national existence in many and often surprising ways. This resource consists of two major segments: The fish supplies of a vast coastal area and of the lakes and rivers of the interior of the country; and the wildlife resources comprising a wide variety of birds and fur-bearing animals. The direct contribution of this living resource to the Nation's requirements of food and strategic materials is imposing. The fisheries yield four billion pounds of aquatic products, from which high-protein foods, vitamin oils, animal feeds, and oils that are essential in certain industries are produced. The food which is derived from wildlife includes approximately 9 million pounds from domestic rabbits, another million and a half from small wild game, and 250 million pounds from larger game. Our herds of deer and elk have already yielded a large quantity of hides to be processed into leather for the Army, and other animals and birds have provided a quantity of furs and feathers which have been used in the manufacture of garments and specialized equipment which is indispensable to the armed forces in cold climates.

The Service's resources of men, material, and land have also been enlisted in the war program. Utilizing their technical skills and specialized knowledge, representatives of the Service have already given assistance to the Nation at war. We have instructed the military services in methods of controlling destructive and disease-carrying rodents in Army encampments, provided information of strategic importance about certain remote outposts which are little known except

¹In August 1942 the headquarters of the Fish and Wildlife Service was transferred to Chicago. A liaison office with a small staff remained in Washington to facilitate the maintenance of relationships between the Service and other governmental agencies in Washington.

for the explorations of our naturalists, and controlled species and injurious to crops. We have made available the facilities of our refuges for military training, assisted Army and Navy Intelligence units and military patrols in remote areas in which our field personnel is stationed, and contributed to the material needs of the Navy by carefully harvesting the grain and fiber crops, hay, and timber in the national wildlife refuges.

In addition to these contributions to the war program on the military fronts and at home, the Service has also fulfilled its obligation to continue the basic studies and the protective vigilance and measures necessary to insure the preservation of our fisheries and our wildlife resources for future use.

AIDING THE WAR PROGRAM WITH LAND, VESSELS, AND PERSONNEL

The Aleutian Islands, a national wildlife refuge comprising over 3,000,000 acres, is in the immediate zone of hostilities. Intimate knowledge on the part of Service personnel of the topography and meteorology of this chain of islands, sought by the armed forces, was furnished at their disposal. To the northward lie the Pribilof Islands, summer home of the highly valuable fur seal herd. In view of the possibility of an attack on these islands, which are administered by this Service, their populations of native workers (476) and our personnel (23) of teachers, doctors, and administrators were evacuated to the mainland where essential care of the natives is being continued. Through the branch of National Parks Wildlife, information and photographs of strategic value in relation to Alaskan and Siberian territories were given to Army and Navy authorities.

In its capacity as a land administering agency, the Service was able to cooperate with the military authorities in providing training areas. Sites aggregating 1,845,000 acres were allotted on 35 national wildlife refuges within the United States for many types of Army and Navy training. Despite the vast extent of these activities, disturbance and harm to wildlife have been held to a minimum through careful selection of the areas and through the excellent cooperation of the Army services.

Direct aid was provided also by the transfer of 11 of the largest vessels in the Service's fleet to the Navy, Coast Guard, and Marine Corps.

Our staff of game management agents contributed materially to the internal security of the Nation by furnishing evidence of subversive activities to the Army and Navy Intelligence units, and to the Federal Bureau of Investigation. In Alaska, wildlife agents cooperated

the military forces in patrolling the Territory. More than half of the qualified personnel has been employed in cooperation with war agencies and the Department of Justice in the appraisal and acquisition of lands for war purposes.

At the request of Army and Navy officials, field men of the Service have direct assistance in controlling rodents on numerous military reservations throughout the country. Aid was rendered in curtailing serious damage by rats to subsistence and clothing supplies. Another important phase of the work was the control of plague-carrying field rodents that constituted a menace to the health of troops. It was also necessary to control pocket gophers and kangaroo rats that were undermining airplane runways and building dirt mounds on military airfields, thus presenting a serious hazard to aircraft in taking-off and landing. A Service employee is serving on the faculty of the Army Medical School, delivering lectures on rodent control before classes of the School of Tropical and Military Medicine in order to prepare the candidates to supervise campaigns for the suppression of rodent-borne diseases in tropical countries. Assistance was given to the Navy Department in the development of natural camouflage materials for aquatic situations. Help was also extended that Department in its search for materials that might make fresh water available from sea water. In this connection a great many plant materials were subjected to chemical, biological, and physical tests and a few of them showed promise for practical use. In addition, cooperation was given in the testing of materials for "survival kits." Suggestions were given on subject matter for a Navy manual on "Survival" to be used in training aviators to take care of themselves should they be forced to land in areas remote from civilization.

AIDING THE WAR PROGRAM WITH WILDLIFE AND OTHER CROPS

Through notable increase in the economic use of the Federal wildlife refuges, a variety of contributions were made to national needs. Thus grazing to the extent of 227,585 animal months was authorized and 13,945 tons of hay were harvested during the year. The timber cut included: 10,900 cords of fuel and pulp wood, 488,600 board feet of lumber, and 23,975 posts, poles, and ties. In addition, 18,680 acres of refuge land, cultivated by private individuals and refuge personnel, produced 65,600 pounds of seed crops, 70,000 pounds of fiber crops, and 430,000 bushels of grain and other crops, most of which were used in augmenting the Nation's food supply. Increased fur production made it possible to provide additional material which

for the explorations of our naturalists, and controlled species which are injurious to crops. We have made available the facilities of wildlife refuges for military training, assisted Army and Navy Intelligence units and military patrols in remote areas in which our field personnel is stationed, and contributed to the material needs of the Nation by carefully harvesting the grain and fiber crops, hay, and timber from the national wildlife refuges.

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AIDING THE WAR PROGRAM WITH LAND, VESSELS, MEN

The Aleutian Islands, a national wildlife refuge comprising nearly 3,000,000 acres, is in the immediate zone of hostilities. Intimate knowledge on the part of Service personnel of the topography and meteorology of this chain of islands, sought by the armed forces, was freely placed at their disposal. To the northward lie the Pribilof Islands, summer home of the highly valuable fur seal herd. In view of the possibility of an attack on these islands, which are administered by this Service, their populations of native workers (476) and our personnel (23) of teachers, doctors, and administrators were evacuated to the mainland where essential care of the natives is being continued. Through the branch of National Parks Wildlife, information and photographs of strategic value in relation to Alaskan and Siberian territories were given to Army and Navy authorities.

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was vitally important in the manufacture of special clothing for the use of the armed forces in frigid climates.

The results of the biological developments of refuge lands undertaken during the height of CCC and WPA activities are reflected in increases in wildlife. Between 1937 and 1942, big game on national wildlife refuges increased 80 percent. Waterfowl populations increased from 27 millions in 1934 to between 115 and 120 millions in the spring of 1943, and 25 million waterfowl used the refuges for resting and feeding along the major flyways during the 1942 fall migration. Increases approximating those of the waterfowl are also evident in the upland game, which in the case of pheasants have resulted in the extraordinary density of 4 birds per acre on the Sand Lake Refuge in South Dakota.

The total revenue from the economic uses on national wildlife refuges, including the disposition of big game animals, fur animals, and surplus products, was \$213,800.

Sealing on the Pribilof Islands in the 1942 season was interrupted suddenly, after only 127 skins had been taken, when evacuation of the islands was ordered by military authorities. Before the opening of the 1943 season, however, sufficient personnel was returned to resume sealing and a large take of skins is anticipated. Supplied by the take of the previous season, two public auction sales of fur-seal skins were held at St. Louis, Mo., one in October and one in March. In all, 42,447 sealskins were sold for the account of the Government for a total of \$1,537,530.87.

The handling of blue foxes on the Pribilof Islands is incidental to sealing activities. In the 1942-43 season, 785 fox skins were taken, of which 182 were from St. Paul, and 603 were from St. George Islands.

During the year there were sold at public auction 780 blue, and 5 white, fox skins taken on the islands. The blue pelts sold for \$10,068 and the white for \$85, a total of \$10,153.

Wartime utilization of fish, game, and fur, consistent with preservation of breeding stock, is being emphasized on Indian lands through investigation of these resources, extension work among the Indians, and action by the Tribal Councils. Fisheries, long the most important wildlife activity among Indians, are being expanded. Investigations of Pacific Northwest salmon fisheries, of which the Indians' share approximates 1 million dollars annually, have resulted in closer cooperation between the Indians and the State of Washington, particularly at Celilo Falls; increased numbers of spawning fish in the Yakima River spring run of chinooks; planting of fry to establish new runs of silver salmon in three coastal streams; an increased efficiency in

marketing the Quinault sockeye catch. At Red Lake, Minn., the commercial catch, chiefly walleyed pike, was increased from 650,000 pounds to 1,000,000 pounds, on the basis of studies by Service biologists. The supply of fish for local consumption among the Indians was increased by plantings, by improved management recommended after scientific study, and by expansion of fish production in stock-watering reservoirs.

Few reservations have had a surplus of game to draw upon as a wartime source of meat, because of the prevalence of unrestricted hunting by Indians. At Crow and Pine Ridge, surplus buffalos have been used, and unusually large numbers of rabbits have been killed on several areas. In Alaska, where scientific studies of lichen range showed the desirability of reducing the Nunivak Island reindeer herd, authority was given for reduction from 19,000 to 10,000 head. Both meat and hides are to be used by military and civilian populations entirely within the Territory.

Improved management and marketing of furs is now being carried out in several northern reservations as the result of recommendations following scientific investigations. Beaver management plans have been started at Grand Portage, Rosebud, Pine Ridge, and Flathead. At the last reservation a system of marketing through public auction has increased returns to the trappers by about 30 percent and has facilitated law enforcement. A somewhat similar muskrat management project, based upon intensive investigations by Service biologists, has been authorized at Bad River, Wis., on 10,105 acres.

STIMULATION OF FOOD PRODUCTION

Valuable as were the direct contributions of the Service to the national food and fur supplies, they were far exceeded by the results of stimulating and aiding production through regular channels and of encouraging the use of partially or wholly neglected resources.

FISHERY PRODUCTS

Because of war-created needs, the products of the Nation's fisheries are finding a greater variety of uses and are more urgently needed than ever before. As excellent muscle-builders, rich in vitamins and minerals, fish are especially valuable foods for fighting men and civilians. Canned fish are a concentrated food easily transported to soldiers in remote bases or on battlefields. Vitamin oils obtained from fish livers are helping to sharpen the eyesight of night bombing crews or of troops on night maneuvers, and are aiding troops and civilians to build up resistance to respiratory infections. Animal-feeding meals and oils,

derived chiefly from Pacific pilchards, herring, and menhaden, are providing the proteins and vitamins needed to produce hogs and poultry in larger numbers and of better quality. In the industrial field, fish oils have a variety of important uses. They are used, for example, in the preparation of glycerine for explosives and as core oils for aluminum castings and lubricants for delicate machinery.

During the first year of the war the yield of the United States fisheries fell more than a billion pounds below the 5-billion pound catch of 1941. This decline, which unfortunately occurred in a year when demands for the products of the fisheries were at an unprecedented high, was caused by the requisitioning of fishing boats by the military services, manpower difficulties, and other war-created hindrances to normal operation. Early in 1943 it was announced that if all governmental and civilian requirements for fish were to be met, a catch of 6 billion pounds would be needed in 1943.

To assist the fisheries to operate effectively in the midst of war, the President established the Office of the Coordinator of Fisheries by Executive order in July 1943. The Office was staffed by members of the Fish and Wildlife Service, its officials and field representatives being drawn largely from the Divisions of Fishery Industries and Fishery Biology. While direct services to the fishing industry are now performed largely by the Coordinator's Office, and are summarized in a separate section of this annual report, the basic research activities have remained in the Fish and Wildlife Service.

Improvement of fishery technology.—Technological studies have been concerned chiefly with the production, preservation, and utilization of fishery products and byproducts. Laboratories were maintained at College Park, Md.; Seattle, Wash.; Ketchikan, Alaska; and at Mayaguez, Puerto Rico.

Because the amount of tin available for manufacturers of fishery products has been greatly curtailed, extensive research has been conducted on nonmetallic containers for fresh shucked oysters, clams, and mussels; for fresh cooked crab meat and shrimps and for fresh fillets. The aim of this research is to aid industry and government to determine to what extent it is possible to use substitute materials, and to develop practicable substitutes for tin.

Packs of all types of canned fishery products have been made in containers fabricated from substitute plates containing no tin, or smaller amounts of tin than the plate formerly used. These are being subjected to storage, shipping, and other tests to determine their suitability. To effect further possible savings in tin for preserved fishery products, experiments are being continued to develop satisfactory dehydrated and salted fish products.

Field and laboratory tests have been made to determine the utility of fibers other than manila in the fabrication of cordage and certain types of trawl nets. The results show, for example, where sisal, jute, hemp, istle, and other hard and soft fibers can be used in the fishing industry.

Studies in Service laboratories and in cooperation with industrial and other agencies have led to the development of new canned fishery products for government and civilian use. Principal among these are canned Maine sea herring, menhaden, mussels, and a fish loaf, all of which are now being packed commercially. Cooperative work with the Army has developed several promising special canned rations incorporating fish.

To further the use of species of fishes which formerly were discarded, or utilized in small quantities, studies are being made to determine suitable methods of handling and preservation. Other investigations deal with their nutritive value and with the development of recipes for cooking these new species. Some of the groups investigated have been soupfin shark, Alaska sharks, carp, burbot, monkfish, skates, and mussels. "Wartime Fish Cookery" and "Home Canning of Fishery Products," two publications designed to guide the consumer to fuller and more satisfactory use of fish, were released.

Work on vitamin oils provided a basis for more judicious utilization of raw material sources and has supplied information on the stability of these oils and on handling and processing factors that influence it.

The war made it essential to find new sources of supply of agar, a seaweed product which is extensively used as a medium in bacteriological research and in numerous food industries and in manufacturing processes. Formerly 90 percent of the agar used in the United States was imported from Japan. Our technologists are now investigating the properties of numerous seaweed gums in an attempt to find a satisfactory substitute for agar.

Experiments in adapting a purse seine to South Atlantic shrimp trawlers promise a materially increased catch of other food species by these vessels during the season when no shrimp are caught.

Improvement of fishery economics.—Investigations have been directly concerned with holding production at a high level and with solving problems of distribution. The use of menhaden from the southern fisheries as bait in a northern cod fishery where other bait was not available demonstrated the translation of research into fish production. Processing Great Lakes herring into fillets for Army use, and establishing industrial production for such neglected species as gars, sharks, and king whiting are representative of research activities leading to immediate action. The king whiting, a potentially

valuable variety produced incidentally to the capture of another species, heretofore had been discarded but now has found a satisfactory market. Other species, such as mullet, are readily marketed in certain parts of their range but are neglected in other areas of abundance.

Dissemination of fishery statistics.—The statistical section continued the collection and dissemination of data relating to the commercial catch of fishery products, employment of personnel, craft, and gear in the industry, and the production of manufactured fishery commodities. It was necessary, however, to curtail certain of the regular statistical surveys and to expand others in order to undertake the collection of specific data required by the various war planning and regulatory agencies.

The collection and publication of monthly data on the important vitamin-A industry was begun during the year, and the quarterly survey to obtain information on the domestic production and stocks of all marine animal oils was changed to a monthly basis. Special surveys were conducted to obtain information for the War Shipping Administration on the earnings of certain Atlantic and Pacific coast fishing craft, and data were collected for the Office of Price Administration on the price ceilings of individual wholesale dealers for manufactured fishery products.

When shortages of critical materials developed as a result of the war, it became necessary to prepare estimates on the annual requirements of the industry for supplies and equipment. Fortunately, a Nation-wide survey to obtain data on the material needs of the industry had been begun during the previous fiscal year and was completed in the fall of 1942. The data obtained in this survey and the information collected in a special canvass relative to the industry's requirements of controlled materials (steel, copper, and aluminum) served as a basis for estimates that were used in obtaining allocations of supplies which were required by the fishing industry.

In order to assist the Federal agencies concerned with the Nation's food program in planning for the purchase and allocation of fishery products, historical information relative to the industry, current production data, field reports on the trends of the fisheries, and estimates of future production were prepared throughout the year for their use.

Fishery market news service.—To meet the requests of war agencies and a war-gearred fishing industry, the daily reports, monthly and annual summaries, and the monthly review have all been expanded to cover more areas and supply additional current information on all phases of production, distribution, and marketing.

All daily reports have generally increased the volume of their price quotations. The New York report now includes Norfolk production data, while the Boston report has better coverage of Maine, and the Seattle report has better coverage of Oregon and California. Federal Regulations, and limitation of allocation orders, are now either reprinted or briefed in the daily reports to inform the fishing industry of the meaning of these rules and regulations as soon as possible. The industry has indicated that it appreciates this added service.

The weekly summaries have been expanded, particularly in the Boston report, in order to make weighted average prices immediately available. Wholesale fish prices of this type are supplied the Bureau of Labor Statistics weekly for inclusion in its index which covers 900 price series.

Monthly and annual summaries have increased their coverage in both text and tabular material. Each annual now includes a monthly index of production and tables defining market classifications for fish and shellfish. The Chicago and New Orleans monthly summaries have added a series of weekly price ranges.

"Fishery Market News," the monthly review issued in Washington, has added a number of pages for timely articles on matters affecting the fisheries, particularly Federal regulations. Complete or abbreviated versions of the latter are included as issued to provide a convenient form of reference. A better picture of the fisheries from month to month also has been developed by including additional sectional production and price data both in text and graphic form.

Consumer relations.—Consumers, deprived of the usual abundance and variety of customary foods, needed guidance in maintaining an adequate diet from the foods that were available. In response to this need, the task of informing the public how to derive the maximum food values from the Nation's aquatic resources was undertaken by the Service. Information based on technological investigations in Service laboratories was distributed to consumers through every available educational medium.

Fishery exploratory investigations.—The war has greatly stimulated the establishment of fishery industries in the American Republics and other areas of the Western Hemisphere. While the Caribbean area normally consumes 315,000,000 pounds of fish yearly, it produces only about 160,000,000 pounds. Imports, chiefly salt fish, make up the difference but have been drastically curtailed by reduced transportation facilities.

To determine whether this shortage could be made up by expansion of local fisheries, the Office of the Coordinator of Inter-American Affairs provided funds to the Service for a factual survey. Nearly all

Republics, Colonies, and Possessions in the Caribbean Area were visited by this mission between April and November 1942. Reports and recommendations for each political unit and for the area as a whole have been completed, and have formed the basis of action toward developing or expanding fisheries in this area.

Venezuela, Panama Bay, and Cuba offer the greatest opportunities for expansion of production, but nearly all other parts of the area also can produce more fish. As one result of the work of the Mission, the British colonial governments have procured fishing equipment to maintain normal production and will undertake an intensive cooperative survey of fishing and processing methods. Fish salting projects have been initiated in Cuba and Haiti; and Venezuela has requested assistance in the development of its salt fish industry.

The Service cooperated with the Board of Economic Warfare in surveying fishing possibilities in the Southwest Pacific as part of a general investigation to promote local production of foodstuffs for consumption by our armed forces in that area as well as by civilian populations. It was found that small-scale fisheries could be established at many points. The board has furnished fishing gear and trained personnel to exploit these fisheries.

The Service also cooperated with the Anglo-American Caribbean Commission in the expansion of fisheries in the Bahama Islands. As a result of Service recommendations, tuna were commercially caught and canned in this area. Service representatives advised the local industry regarding methods of preserving fishery products and means for obtaining greater utilization of the fishery resources.

RABBIT AND FURRED-GAME MEAT

World War II has brought about a shortage of many customary foods, and radical changes in eating habits have resulted. Foods that many of us never before considered eating are now being favored. The domestic rabbit is one of the new sources that is helping to solve the meat problem in many homes.

The Federal Government has been recommending domestic rabbit raising for 20 years and during the last 2 years has been cooperating in the food-for-freedom program to put rabbit meat on the dining table. In 1923 about 2,000,000 pounds of domestic rabbit meat were produced annually for food alone; in 1942, the amount was 9,000,000 pounds. Future production is expected to be as much as 12,000,000 pounds. As a result of the Service's campaign to stimulate the production of rabbit meat, new backyard rabbitries are appearing in every community. City and suburban dwellers are learning that for the time, labor, and expense involved, rabbits pay a handsome dividend

in good food. Key men have been selected in each State to cooperate with State colleges and universities, State and county food production units, and with the American Rabbit and Cavy Breeders Association and its affiliated clubs to increase the production and use of domestic rabbit meat.

Since September 1942, the Service has published and distributed 95,000 copies of Conservation Bulletin 25, "Rabbit Raising," to inquirers in every State in the Union and 20 foreign countries. The Extension Service personnel of about 10 percent of all the counties in the United States has requested quantities of these bulletins. The demand for information about rabbits has been so great that 15 States have reproduced for local distribution discussions of the subject which this Service has published.

Encouragement is being given also to a greater utilization of muskrat, raccoon, and opossum meat for human consumption. The estimated production of muskrat meat in 1942 was 1,000,000 pounds, raccoon 400,000 pounds, and opossum 200,000 pounds. It is possible to encourage greater use of these meats by promotional and educational work through the field force of this Service.

PROPAGATION OF FOOD AND GAME FISHES

A shift of emphasis in the propagation of food and game fishes has taken place and is continuing. Loss of manpower, shortages and increased costs of fish food, higher wages, and not least of all the need for increased food production, have influenced this trend.

Altogether 14 fish-cultural stations have been closed and 2 more will curtail operations or close July 1, 1943. These include stations whose production was relatively low and those producing trout for stocking recreational areas. Further reduction has been made by the suspension of cooperative nurseries which propagated trout for stocking Federal forest areas until the fishing load warrants additional plantings. The general policy is to reduce the stocking of game fish in less accessible bodies of water and to concentrate personnel and funds on the production of food fishes.

During 1942 the farm-pond program, advocated and assisted by the Service, has gained impetus. Ponds are fertilized, stocked with balanced populations of fish, and then managed according to recognized practices. They may come into production on a sustained basis within one year and require no restocking. Thus effort in succeeding years may be applied to bringing new areas into production.

There was an increase of 356 percent in fingerlings allotted to ponds constructed under the supervision of the Soil Conservation Service, and of 351 percent to other farm ponds. These will yield

an estimated increase during 1943 of 205 and 235 percent, respectively, in the weight of fish produced. The total production this year of farm ponds stocked in the last 2-year period is estimated at 1,415,805 pounds of fish.

Cooperative distribution programs have been set up between various State and Federal hatcheries for stocking farm ponds and other waters. This has been accomplished by the new regional superintendents of fish distribution. Both Federal and State commitments are filled from the hatchery nearest to the applicant. By preventing a duplication of stocking and distribution, there is better utilization of fingerling fish, a saving of tires and gasoline, and more efficient use of State and Federal fish-cultural facilities, including the time of the personnel.

Salmon salvage operations were increased on the Columbia and begun on the Sacramento Rivers. With the closure of the barrier created by the Shasta Dam, salmon runs were completely cut off in the Sacramento during the fall of 1942. This jeopardizes a commercial catch of between 750,000 and 1,500,000 pounds of salmon. The first spawning and salvage operations will begin during the 1943 spawning run.

In total production there was an increase from 5.86 billion fishes and eggs in 1941 to 7.82 billions in 1942. Among the game fishes these was a reduction in the take of trout eggs and a decrease in trout production. The largest increase in the egg take resulted from the salvage of cod, haddock, and pollock. Commercial species showing an increase included buffalo, whitefish, lake herring, cod, flounder, pollock, and lobster. Black bass, which are used to stock farm fish ponds, were produced in greater number.

Hatchery activities have been intensified for the production of warm-water fishes for farm ponds and the salvage and propagation of salmon to replace spawning runs on the Pacific coast. This will result in larger production of these species. Stocking of trout is concentrated in the areas still most heavily fished and has been temporarily abandoned in less accessible areas.

FEDERAL AID IN WILDLIFE RESTORATION

During the year Federal aid in wildlife restoration was reduced in scope due to conditions imposed by the war. Notwithstanding lessening of activities, however, the program functioned very effectively.

Investigations to determine wildlife populations and their trends as well as the carrying capacities of the ranges were emphasized by the cooperating states. The information sought is essential to sound management of this natural resource. Maintenance of full popula-

tions of wildlife is important as the basis for hunting which provides outdoor recreation for millions of citizens. Without management guided by adequate research, hunting pressure cannot be varied to control depredations, to check range deterioration where overpopulations exist, and to protect wildlife where it should be increased. The bagging of game, which yielded a quarter of a billion pounds of wild meat by the hunters of the Nation during the past hunting season, proves the value of wildlife in providing a supplementary source of food.

Immediately following World War I, there was an upsurge in the sale of hunting licenses, the number sold greatly exceeding the totals for pre-war years. In anticipation of a like situation developing after the present struggle, it is very important that the States maintain wildlife populations on a high plane of productiveness. By the investigative measures conducted through the medium of the Federal-aid program, and the translation of findings into appropriate regulation of hunting seasons and bag limits, wildlife populations can be maintained in a State that will permit use and enjoyment by millions of hunters.

While stress was placed on wildlife management investigations during the year, the States also continued land acquisition and development. Due to material and equipment shortages caused by the war, major construction work could not be undertaken. The States, however, have been able to continue with developmental measures such as cooperating with farmers in soil conservation districts in the planting of perennial legumes in field borders and waste places as an aid to soil conservation and to provide wildlife food and cover. They have also been able to continue the trapping and transplanting of game birds and mammals and furbearers from places where surpluses exist to suitable but vacant areas. Land acquisition efforts have been directed toward the purchase of areas of no particular value for agricultural uses which may advantageously be developed for wildlife during the post-war readjustment period.

The sum of \$1,250,000 was appropriated to carry out the purposes of the Federal Aid in Wildlife Restoration Act this year, as compared with \$2,750,000 for the fiscal year 1942. As of December 31, 1942, the special Federal aid to wildlife restoration fund in the Treasury contained \$9,329,849. Preliminary information on collections of the Federal excise tax on sporting arms and ammunition indicates that the yield for this fiscal year will be approximately \$1,100,000. This will be a great reduction below the \$5,072,588 collected and covered into the special fund during the fiscal year 1942, but it should be remembered that production of the articles upon which the tax is paid was sus-

pended until quite recently, when authorization was granted and scarce materials were made available to meet ammunition requirements for the 1943 hunting season.

Through appropriate legislation, Georgia became eligible for benefits under the cooperative wildlife restoration program during the year, leaving Nevada as the only State not participating. Outside of the United States, restoration projects are in progress in Alaska, Puerto Rico, and the Virgin Islands, extension to them of the benefits of the Federal Aid in Wildlife Restoration Act having been authorized within the fiscal year 1942 by an amendment to the basic law.

WARTIME UTILIZATION OF FURS AND HIDES

FURS AND FUR FIBERS

Because of their warmth-retaining qualities, animal fibers are indispensable to the armed forces and civilians in cold climates. In the present crisis it is necessary to make full use of animal fibers and to allocate each type to the purpose for which it is best adapted. Our objective has been to determine the value of fur as a substitute for other fibers and to develop effective uses for fur byproducts that have hitherto been wasted. Cooperative research with the Bureaus of Animal Industry and Human Nutrition and Home Economics has contributed valuable information to the Office of Quartermaster General. Four confidential reports of the results of this work were prepared and forwarded to that office. Commercial furs were compared with piled fabrics and other materials to determine resistance to abrasion, tearing strength, air permeability, compressibility, compressional resilience, and other qualities. Microscopic analysis of the fibers is necessary to determine the characteristics which contribute to these physical qualities.

Research in the utilization of industrial waste hairs has demonstrated their suitability for making soft brushes and for felts of various kinds. Long-haired furs were studied for their ability to shed ice crystal accumulations, caribou hair for its buoyancy, and Angora rabbit fibers for warmth-retaining qualities. "The report on air permeability of furs and fabrics," says the Quartermaster General, "is proving particularly valuable at this time, inasmuch as it gives us a base on which to isolate the comparative factors of thermal insulation and air permeability in determining the over-all warmth of furs, various types of fabrics, pile fabrics, and windproofs. It is expected that the reports which you have rendered will make a substantial contribution to the development of sound equipment for cold weather."

BIG-GAME HIDES

Because of increased leather requirements and the drastic curtailment of importations, it is of immediate importance that full use be made of the domestic supply of deer and elk hides. A general preference order, reserving deer skin leather for military uses, was issued by the War Production Board.

During the 1942-43 big game season, 615,000 deer and 34,000 elks were taken by licensed hunters in the United States, and approximately 162,000 hides from this source were channeled into industry. Although this number represents only about a fourth of the animals taken during the 1942-43 season, the cooperators feel that assembling that many was very creditable, considering that the demand for this raw material was not known until the first of November. This was a cooperative undertaking to obtain additional leather for the Army. The Quartermaster Corps, the War Production Board, the Federal Departments of Agriculture and Interior, State game and conservation departments, sportsmen's organizations, individual hunters, hide dealers, and leather manufacturers are working together to salvage all the available deer and elk hides—a program that will be continued during the 1943-44 hunting season.

CONSERVATION OF FOOD AND WILDLIFE RESOURCES

The variety of ways in which the Fish and Wildlife Service aids directly or indirectly in production of the Nation's food and wildlife is evident. But production is not enough; what we grow we must protect so that it will be available for use or to assure future supplies. To that end the Service devotes its basic scientific investigations of fisheries and wildlife, and its activities in predator and rodent control, law enforcement, and maintenance and development of wildlife refuges.

CONTROL OF PREDATORY ANIMALS AND INJURIOUS RODENTS

Cooperative predator and rodent control contributed substantially to the war food program of the Nation. The taking of 115,287 predatory animals resulted in the saving of thousands of sheep, calves, and poultry; the treatment of 14,537,033 acres of rodent-infested lands prevented the loss of tons of agricultural crops and range forage; and the control of the common house rat saved large quantities of stored food and feed.

Of the 115,287 predatory animals taken in cooperative projects, 103,981 were coyotes, 1,014 wolves, 9,527 bobcats and lynx, 147 mountain lions, and 618 stock-killing bears. In cooperative field rodent

control work, 2,514,500 acres of infested lands were treated under direct supervision of the Service's field personnel and cooperators and 12,022,533 acres were treated under general instructions.

Total expenditures for both predator and rodent control consisted of \$770,209 from departmental funds, \$540,275 from cooperating states, \$1,344,394 from cooperating counties, livestock and agricultural associations and others, and \$21,400 from emergency funds.

Eight hundred and thirteen thousand, three hundred and sixty-one pounds of rodent bait materials were distributed to cooperators from the Service's Supply Depot at Pocatello, Idaho, in addition to manufactured supplies and equipment used by the Service and cooperators in predatory animal control.

Control operations played an important role in protecting livestock, thus increasing the production of food, wool, and mohair. The control of burrowing field rodents saved vital irrigation structures from damage. The destruction of warehoused fabrics and other strategic materials and the loss and contamination of a variety of stored foods was greatly reduced as a result of a Nation-wide effort to control rats. The Service intensified its rat control activities in the Southeastern and Gulf States in cooperation with local health departments to assist in curtailing a rising incidence of murine typhus, and the work was attended by noteworthy success.

Control of rodents and predators to air maximum production of farm crops and livestock was authorized on only seven Indian reservations this year, and even there the work was hampered by limited funds. The need for control was in each case substantiated by scientific investigation. Need for coyote control also has been found at San Carlos and Fort Apache, but a more complete study has been requested. This is now under way.

Several factors have operated to increase the seriousness of the predator and rodent control problem. There has been a marked decrease in the activity of private trappers, who normally hunt and trap predatory animals for their pelt values. These men have either been inducted into the military service, or have found more remunerative employment. The lack of this supplement to organized predator control has increased the burden on the predatory animal hunters of the Service and its cooperators. Our men, unassisted, could not conduct proper control work on all affected areas. Insufficient manpower is also making it impossible adequately to control crop-destroying field rodents. The influx of workers into industrial centers and the shortage of disposal facilities for trash and garbage in these areas has added greatly to the rat control problem, as has the storage of food and feed-stuffs in improvised nonrodent-proof buildings.

Reports of severe depredations by predators and rodents continue to be received in volume, and considered in the aggregate, they present a serious picture of destruction of resources that are urgently needed in prosecuting the war. Of great interest and importance, therefore, are the operations of the Fish and Wildlife Service in reducing losses. The following instances illustrate the benefits derived from timely and scientifically applied control measures.

A Service hunter captured the coyotes that had taken an average of 18 chickens a day for some time on one farm and had destroyed 50 percent of the turkeys on a neighboring place in Martin County, Tex. Poultry and egg sales in Stonewall County, Tex., now amount to \$20,000 monthly but this was made possible in large part through the taking of 1,419 coyotes and 262 bobcats from the county since 1937. Predator depredations previously had been so severe that poultry could not be profitably raised. Previous to 1942, because of severe coyote depredations, it was impossible to produce turkeys at a profit in the vicinity of Groveland, Tuolumne County, Calif., but intensive control work permitted the raising of 5,000 in 1942; and it is anticipated that 35,000 turkeys will be produced in this area for the 1943 market. Numerous instances of the benefits of control work have been reported.

CONTROL OF INJURIOUS BIRDS

Available laboratory and field facilities were concentrated on solving or alleviating pressing problems in the control of bird depredations on agricultural crops. Severe waterfowl damage was investigated in Colorado and Idaho, and in Colorado the appraisal was made of the extent of loss. Where economically justified, measures for control of the offending birds were quickly put into effect with good results. Bird depredations upon the rice crop in California and Louisiana received special consideration. Procedures for minimizing damage were outlined and new devices for deterring the birds were developed and prepared for testing. The bird control problems of the growing army of victory gardeners also were given attention.

BIOLOGICAL INVESTIGATION OF THE FISHERIES

The nature of the fishery biological investigations conducted by the Service during the past year has been controlled by two diverse and equally urgent demands born of war conditions. Our biological investigators, because of their long association with fishermen and the fishing industry, have been peculiarly fitted to give advice and direct assistance in the all-important problem of maintaining and increasing the yield of food and essential byproducts of aquatic origin. Their

time and abilities have been extensively utilized in this wartime service. In addition, there remains the necessity of continuing the month-by-month observations of the condition of the fishery stocks and of the factors—economic and natural—which determine the future yield of the fisheries.

This twofold demand has been met as follows. To assist in staffing the Office of the Coordinator of Fisheries with competent workers, eight key biologists were detailed as area coordinators to serve in the regions in which they have been conducting fishery investigations for a period of years. Their assistants have also been called upon to aid in this work to varying extents in addition to carrying on research. Purely theoretical work on the fisheries has been abandoned, and basic research has been confined to providing information essential to maintaining production of the major fisheries. Because the war has brought violent and far-reaching changes in the fishing industry, it is more necessary than ever before to record the increase or decrease of fishing intensity and the changes in the abundance of fish stocks so that our use of the resource may be prudent and may not endanger future supplies.

North Atlantic Area.—The New England section, center of the fresh-fish industry of the country, has felt the effect of war-created hindrances to production perhaps more directly than any other area. Although figures cannot be given for security reasons, a large number of the most productive fishing vessels were requisitioned by the military services for direct war use. Since the annual production of a single large trawler is approximately 5 million pounds, this reduction of the fishing fleet has produced an inevitable effect on the quantity of fish landed. During the calendar year 1942 landings at the principal New England ports—Boston, Gloucester, and Portland—declined by 100,000,000 pounds, from 473,000,000 pounds in 1941 to 373,000,000 in 1942.

This decline has been partially offset by an increase in the production of the small boat fleets at New Bedford, Mass., and Rockland, Maine. At New Bedford, a large and important fishery for yellowtail flounders has grown up within the past 2 or 3 years, the catch increasing from about 3,500,000 pounds in 1938 to some 37,000,000 in 1942. Because the fishing grounds for yellowtails lie relatively close inshore, small boats of various types can be used in this fishery, with the result that the New Bedford fleet, in contrast to almost all others in New England, has actually increased in size since the beginning of the war. The growing importance of Rockland, Maine, as a fishery port is due largely to the booming rosefish industry, in which many small and medium sized boats, which can land at the smaller ports, are engaged.

Observations on these two rapidly growing fisheries have given rise to some concern. There are indications that the rosefish grows very slowly, which would make it particularly susceptible to overfishing. The full effects of the recent tremendous expansion of the fishery cannot yet be measured. The yellowtail stock is showing some signs of reduced abundance, with a high percentage of the available fish being removed each year.

The haddock population, on the other hand, is more abundant than at any time in the past ten years because of the reduction in the number of large trawlers. The larger spawning population which will result should insure good catches in the next several years.

To compensate for the decline in production caused by reductions in gear and manpower, the North Atlantic staff has encouraged the use of various edible species formerly discarded for lack of a market. These have resulted in increased landings of the angler-fish, raja-fish, and red hake. A wholly new industry for the canning of sea mussels was developed largely as a result of the Service's encouragement and information on available supplies. During the 1942-43 season a pack of 40,000 cases, representing more than a million pounds of food, was made. Alewives, which this year supported an important canning industry, were stocked in many suitable streams from which they had been eliminated by dams or overfishing. The program of creating runs of Atlantic salmon in streams now devoid of them also is meeting with success, judging by the large seaward migration of salmon smolts in the Pemaquid River.

Middle Atlantic Area.—Crab production, always an important industry in the Middle Atlantic and Chesapeake Bay States, assumed new significance when the war cut off the annual imports of 10 million pounds of canned crab meat from Japan. Besides furnishing general guidance to the States in maintaining a high level of crab production, the Service has conducted specific studies in an area set aside by the State of Virginia as a seasonal sanctuary for spawning crabs. The early results have been encouraging, indicating an increase in the number of spawning crabs and providing evidence that the sanctuary principle in crab conservation is both biologically and administratively sound. The crab population in the Chesapeake, as well as commercial production, has increased appreciably since the refuge was established.

A marked increase in the yield of striped bass on the Atlantic coast, especially from Chesapeake Bay to New England, occurred during the 1942 season. This was mainly the result of unusually successful spawning in Chesapeake Bay during 1940 and was similar to the period of abundance which began in 1936 as a result of a good spawn-

ing season in the same region in 1934. In accordance with a recommendation of the Service, in which the Atlantic States Marine Fisheries Commission concurred, several additional Atlantic Coast States have adopted legal size limit of 16 inches for striped bass. Compared with smaller limits, the 16-inch size insures a larger return from the resource by providing for a greater aggregate production over a longer period from each brood of fish.

Recommendations for the management of the Atlantic coast shad fishery were submitted to the State conservation departments and the Atlantic States Marine Fisheries Commission. In the Hudson River, where restoration of the shad runs has been singularly successful, the catch was increased within biological sound limits to meet the wartime need for additional food. The Hudson yielded more than 4,000,000 pounds of shad during the 1943 fishing season, compared with yields of about 3,500,000 pounds immediately before the war. In the Chesapeake Bay, where depletion of the shad fisheries has been relatively severe, the fishing rate was somewhat reduced as a result of the manpower shortage and kindred difficulties. This reduced intensity of fishing will allow more shad to spawn and should assist in restoring the population.

South Atlantic and Gulf Areas.—Major efforts were directed toward maintaining or increasing production by encouraging the marketing of previously little used species, by having certain areas opened to commercial fishing, and by assisting the industry with priority, food rationing, manpower and other wartime problems. Such duties, connected with the Office of Fishery Coordination, became practically a full-time responsibility early in March, hence biological research was of necessity curtailed and only those programs that could not be dropped without serious consequences received attention.

Pacific Area.—Biological investigations of salmon and herring in Alaska were directed toward meeting wartime demands for additional millions of pounds of fishery products from this region.

Study of the Alaska herring populations was continued and from the information obtained it was possible to predict the size and abundance of herring that will be available in the coming year and to allot quotas to permit the maximum catch without causing depletion.

Biological studies of pink salmon were continued at the Little Port Walter field station in southeastern Alaska where a two-way salmon counting weir is operated. The first completed runs from this point showed that only 2.7 percent of the pink salmon survived the period spent at sea. This knowledge was used in predicting the size of the commercial catch for 1943 and the prediction was made available to

the industry so that operations could be planned to make as large a catch as possible without endangering the stock.

In the Bristol Bay area adequate numbers of spawning red salmon were observed in many of the streams. A migration of 360,000 adult red salmon was counted through the weir at Brook's Lake, the largest run since the installation of the weir. The marking experiments on young salmon in the Naknek River system indicated the possibility of a good run of red salmon in 1945.

While handicapped by a greatly reduced fishing fleet, fewer fishermen, and fewer workers in shore plants, the pilchard industry is faced with larger demands for canned sardines, oil, and meal than ever before. In spite of production difficulties the total Pacific coast catch during the 1942-43 season was 550,000 tons—within 6 percent of the average for the preceding 5 years. The bulk of the fish were larger than in several past seasons, owing to unusual availability of pilchards 3½ and 4½ years old.

Because of the need of maintaining the yield of pilchards at as high a level as possible without endangering the future supply, the emphasis in pilchard research is directed toward devising means of measuring the resource and determining the effect of the fishery upon it.

As a consequence of wartime demands for vitamin A, intensive fisheries for certain species of sharks were carried on along the Pacific coast of the United States and Mexico. The Fish and Wildlife Service has acted as a clearing house between the several State conservation agencies on the Pacific coast in encouraging and effecting interstate collaboration in shark research.

Great Lakes area.—Production of food fishes in the Great Lakes area received a severe setback through failure of the 1943 spring fishery for smelt. Despite elaborate preparations of the Service and cooperating State and Federal agencies for the fullest exploitation of the run, this fishery, which had been expected to yield 10 million pounds, produced no more than a quarter of a million. The scarcity of smelt has been attributed to severe mortality, the cause of which is unknown.

Improved market conditions have resulted in increased yields and better utilization of carp, suckers, and other low-priced fishes.

In the Great Lakes area the manpower shortage handicapped production much more severely than did scarcity of equipment. The shortage was particularly severe in the heavily industrialized areas where the transfer of numbers of professional fishermen to war factories aggravated the condition created by the induction of large numbers into the armed forces.

The International Board of Inquiry, established in 1940 by the Governments of the United States and Canada to study methods of preserving and developing the Great Lakes fishing industry, submitted a report on its findings to the Department of State. Most significant of the Board's recommendations were those calling for unified control and continuous scientific observation of the fisheries.

Shellfish investigations.—Oyster production in the United States has declined by 50 percent from the level maintained in the 1890's. Although the Pacific coast oyster industry has made substantial growth during this period, the decline on the Atlantic coast has been so marked that the general downward trend has not been checked. Its principal cause is the system of free fishing which prevails in most of the Atlantic Coast States and which prevents full utilization of our oyster grounds.

Although the quantity and quality of oysters produced in any area can be greatly increased by cultivation, only about 13 percent of the oyster bottoms in our coastal waters are developed by scientific methods of oyster farming. Because of the objection on the part of many southern states to leasing public oyster bottoms to individuals for cultivation, the Service has developed and is advocating a system of state management of public grounds, under which oyster fishermen would cultivate and harvest the oysters under the supervision of the state. It is estimated that such a plan, put into operation on even half the public grounds, would double the yield from these beds.

In areas in which private cultivation of oysters is practiced, the Service continued its assistance by issuing frequent bulletins on the progress of oyster spawning and setting, so that growers might obtain a maximum crop of seed. Assistance was also given in protecting oyster beds against starfish, drills, and other enemies, and instances of oyster mortality due to industrial pollution were investigated.

The State of Maryland has undertaken a system of management of the oyster resources of the Potomac River, based on the Service's recommendations following a survey of this river.

At the request of the State of Texas, a survey was made of present conditions on the principal oyster grounds and numerous administrative and legislative changes were suggested to permit more efficient utilization of this resource through cultivation or oyster farming.

Comprehensive studies conducted jointly by the Service and the Washington Department of Fisheries helped to increase production of the oyster introduced from Japan in 1902. The industry has depended upon annual importations of seed from Japan, hence its existence was threatened by the outbreak of war. Methods of propagation

have now been developed by local oyster growers, giving promise of the continuance of the industry.

As part of the program to stimulate the production of oysters through cultivation, a cooperative experimental and demonstration oyster farm was established in North Carolina on North River, in the vicinity of the Fish and Wildlife Service station at Beaufort. The materials and equipment for the farm were supplied by the State of North Carolina, and supervision was furnished by the Service. Utilization of acreage in the vicinity of the demonstration farm, in addition to that which is being acquired by private concerns in other sections of the State, should yield in the next 2 years from 2 to 5 million pounds of oyster meat, create a profitable market for the large supply of seed oysters on the natural beds, and expedite establishment of an important commercial industry for future employment by fishermen.

Management of angling resources.—Sport fisheries in inland waters are known to attract more than 12,000,000 persons annually. In addition to providing recreation for large numbers of people they are a source of food especially important in wartime when, because of the scarcity of meats, it is difficult to provide a balanced diet. For various reasons there has been a progressive decline in the abundance of game and pan fishes and it is the purpose of Service investigations to develop methods of management which will assist in maintaining and improving the angling resources of our lakes and streams.

A 5-year study of experimental fish management in the Pisgah National Forest in North Carolina and other carefully controlled experiments in the Sierra Nevada Mountains in California show that it is possible to plant too many fish. Overstocking, it was found, increased the demand for food far beyond the available supply, with disastrous effects on both the planted and native trout populations. Large plantings of young fish in the fall were largely lost and did not materially affect the catch in later years. Legal-size fish planted in the spring in numbers adjusted to the available food supply and the size of the resident trout population, on the other hand, resulted in an increase of about 300 percent in the number of fishes caught.

The farm fish pond assumes especial importance in wartime when home production of food is more necessary than ever and the scarcity of other meats emphasizes the value of fish in the diet. Furthermore, land which is of little value for other purposes may frequently be utilized for ponds and brought into a high state of production. Appreciating these facts, the Service has devoted much time and effort to the development of better methods of pond management. The amount of edible fish produced in any body of water depends very

largely on the methods employed in operating the pond and experiments are now in progress to show the way to better management. The largemouth black bass and the bluegill sunfish appear to be the species best suited to farm ponds but they must be present in proper proportion for good results. Experiments at Leesville, Va., and Welaka, Fla., indicate that the best ratio of sunfish to bass is 8 or 10 to 1, instead of 15 to 1 as usually recommended.

One of the most important problems in pond culture is the control of objectionable vegetation which may make the pond unfishable and decrease its productivity. In the past, control of pond weeds has involved the laborious and expensive method of removal by hand. Later it was found that vegetation could be controlled by application of copper sulphate and sodium arsenite. This method has proved very effective in farm ponds. A further advance is the discovery that the coarser aquatic plants can be controlled indirectly by the use of certain inorganic fertilizers. These fertilizers promote the growth of filamentous and "water bloom" algae which smother the weeds and prevent their growth.

Fish protection and engineering developments.—For the past years the supply of salmon in the Columbia River has steadily declined, presumably as a result of the combined influence of overexploitation and the interference of dams and diversions of water. Statistical studies of the commercial catch records have been made to determine the present status and trend of the resource. A survey of the spawning and rearing areas of the Columbia River watershed near completion during the year. It included: spawning potentialities, needs for fish protection at dams and diversions, and the present status of the salmon population. Upon the basis of the findings, programs of fish protection and rehabilitation are prepared. Much attention has been given to salvaging the runs of salmon that forked and spawned above Grand Coulee Dam by transplanting them to tributaries below that point. The success of this program depends on the return of the fish at maturity to the tributaries into which their parents were transplanted. Accordingly, marking experiments have been conducted to determine the accuracy of homing. Other marking studies have been designed to ascertain the relative merits of various hatchery procedures, particularly the length of the rearing period. The large-scale operation of hatcheries in the salvage program has introduced unprecedented problems of nutrition and disease control which have been the subject of extensive investigation. Many of the findings have already been applied.

Preservation of the salmon resources of the Sacramento River, threatened by the construction of Shasta Dam, continued to receive the Service's attention in cooperation with the Bureau of Reclamation. A comprehensive report has been prepared on the work of the last years. The situation on the Sacramento reached a critical stage in November 1942, when the Shasta Dam became an impassable barrier to salmon migrating upstream. Because of the height of the dam, it is not feasible to provide fish ladders as was done at Bonneville and a salvage plan has been developed. This involves the transfer of most of the early run fish to Deer Creek, a tributary of the Sacramento River, where they will be allowed to spawn naturally. The remainder of the spring-run fish and the early part of the fall run will be held in the ponds in Battle Creek and spawned artificially. The greater part of the salmon ascending the Sacramento in the fall will be held between racks constructed in the river over gravel beds suitable for spawning. Observations during the spawning season of 1942 showed that many salmon spawned successfully on these beds.

Pollution studies.—Among establishments vital to the war, munitions factories, plants manufacturing cellulose derivatives, distilleries producing industrial alcohol from grains, petroleum refineries, and even shipyards are discharging voluminous effluents that create new pollution problems in many localities.

With the continued cooperation of the War Department, investigations of conditions produced by these effluents and laboratory studies of the toxicity of the wastes and means of denaturing them have been the major tasks of the Water Quality Laboratories of this Service during the past year. Where feasible, recommendations for control have been made to the proper authorities. Investigations of various new effluents are now in progress and reports on acetylene wastes, metal scourings, and several munitions effluents have been completed.

In addition to studying wartime pollution, units of this Service have cooperated extensively with the State of Mississippi in a pollution-abatement program, and with the Republic of Colombia on special problems. A new and very accurate method of bio-assay of effluent toxins has been devised and measurements made of the peculiar and detrimental oxygen demand of oil films.

WILDLIFE CONSERVATION LAWS AND REGULATIONS

Wildlife-conservation statutes administered by the Service include the: (1) Lacey Act, (2) Migratory Bird Treaty Act, (3) Migratory Bird Conservation Act, (4) Migratory Bird Hunting Stamp Act, (5) Black Bass Law, (6) law protecting wildlife and property on Federal

refuges (sec. 84, Criminal Code), (7) Bald Eagle Act, and (8) through the Alaska Game Commission, the Alaska Game Law of 1925, as amended.

Major amendments to the Migratory Bird Treaty Act regulations in 1942 lengthened the season on waterfowl from 60 days in 1941 to 70 days, permitted hunting each day from sunrise to sunset, and provided for possession of legally killed birds for 30 days after the close of the season.

The 69 salaried Federal game law enforcement officers, working alone or in cooperation with state conservation agents and United States deputy game wardens, obtained convictions of 2,567 violators of wildlife protection statutes, resulting in fines totaling \$75,215.26 and jail sentences of 2,826 days (table 2).

TABLE 1.—Cases of violation of the Migratory Bird Treaty Act disposed of during the year and cases still pending on June 30, 1943

<i>Disposition</i>	<i>Number</i>	<i>Pending</i>	<i>Number</i>
Conviction.....	383	From preceding year.....	109
Dismissal.....	65	New cases.....	419
Nol-pros.....	15		
Found not guilty, jury trial.....	41	Total.....	588
Closed without prosecution.....	15		
No bill rendered.....	3	Disposed of.....	524
Closed by death.....	2		
		Pending at end of year.....	64
Total.....	524		

TABLE 2.—Summary of penalties imposed during the year for violations of wildlife conservation laws

<i>Act</i>	<i>Convictions</i>	<i>Fines and costs</i>	<i>Jail sentences</i>
	<i>Number</i>	<i>Dollars</i>	<i>Days</i>
Migratory Bird Treaty Act.....	383	12,200.85	1,615
Migratory Bird Conservation Act.....	32	1,070.00	180
Migratory Bird Hunting Stamp Act.....	44	930.00	
Wildlife Refuge Trespass Act.....	9	436.70	1,065
Upper Mississippi River Wildlife and Fish Refuge Act.....	2	10.00	60
Lacey Act.....	2	25.00	365
State prosecutions resulting from Lacey Act Investigations.....	73	3,321.05	175
State laws, cooperative prosecutions.....	2,021	57,206.66	336
Black Bass Act.....	1	15.00	
Total.....	2,567	75,215.26	2,826

¹ Also, 300 days suspended in 4 cases and probation for 3¼ years in 21 cases.

² Also, 2,730 days suspended in 8 cases.

³ Probation.

⁴ Suspended.

⁵ Also, 1,126 days suspended in 25 cases.

Reduced travel by civilians has resulted in a corresponding reduction in the number of permits issued for the importation of live wild birds and animals. However, service men returning from overseas

are bringing home many birds and animals as pets. Importation permits issued during the fiscal year were 751 as compared with 1,371 for the preceding year. Birds imported last year numbered 56,211. This year only 27,731 were entered of which 15,000 were quail from Mexico for restocking purposes. A request for a permit to import chaffinches (a prohibited species) was denied. The total number of animals imported was 5,880, of which 3,675 were Rhesus monkeys to be used in scientific experimentation, and 32 were black bears.

Scientific collecting permits were reduced in numbers from 1,779 to 1,510. Only 97 new permits of this kind were issued. There was a corresponding reduction in the number of outstanding scientific possession permits from 604 to 563. New scientific possession permits were issued during the year to 22 persons. Permits issued to take birds and mammals in Alaska for scientific purposes numbered 20. There was practically no change in the number of bird-banding permits, which on June 30 numbered 2,390.

Permittees reported raising in captivity 2,668 wild geese, and 49,943 wild ducks, of which 46,827 were mallards. Other species raised included black ducks, wood ducks, pintails, green-winged teals, and red-heads. The Nation's meat supply was increased by the sale of 19,391 of these ducks and 379 geese for food. Migratory waterfowl sold for propagating purposes included 4,741 ducks and 867 geese. In addition, 6,481 ducks and 178 geese from game farms were liberated.

Permits issued to protect crops from depredations by birds numbered 688, but only a few of these authorized the actual killing of the birds, and then, only after frightening devices were found to be ineffective. To abate crop damage in Colorado, an order was issued to permit the taking of mallards only from December 24, 1942, to January 31, 1943 on agricultural fields in a few areas within the State.

One whaling shore station and three catcher or killer boats were licensed to take and process whales on the California coast, for which \$1,250 in fees were collected and deposited in the United States Treasury.

ENFORCEMENT OF THE ALASKAN GAME LAW

The Alaska Game Commission employs 23 persons, who, with the executive officers, operate 5 planes, 3 sea-going vessels, 17 motor vehicles, and numerous inboard and outboard motor crafts in the enforcement of the game law throughout the Territory.

Cooperative patrols were made with the Royal Mounted Police of Canada to prevent smuggling of high-grade furs. Valuable service

was given to the Army, Navy, and law enforcement agencies in the furnishing of expert knowledge regarding the Territory, its people, climate, and terrain.

Wildlife protection problems in the Territory increased in proportion to the great influx of men in the armed forces and workers on the Alaska Highway. However, these problems were soon largely solved by intensive patrols, arrests, speedy convictions, and cooperation of the military authorities and superintendents of road camps.

During the year 133 persons were convicted for violation of the game laws. Their fines and sentences totaled \$3,765 and 810 days in jail. In addition, they forfeited furs, boats, guns, and traps having a value in excess of \$12,000. Fifty percent of the receipts of the Alaska Game Commission are covered into the Territorial school fund, and the remainder is deposited in the Treasury of the United States.

The Game Commission began its annual meeting in Juneau on January 22. Policies were formulated, regulations were discussed, and the official stations of some of the wildlife agents were changed in response to shifts in populations. Following the meeting, the executive officer conferred with Service officials in Chicago and Washington, D. C., regarding the conservation and development of the Territorial wildlife resources.

ADMINISTRATION OF ALASKA FISHERY LAWS AND REGULATIONS

The Fish and Wildlife Service, which is charged with the responsibility for regulating the time, place, and method of commercial fishing in Alaska under the authority vested in the Department by the act of June 6, 1924, continued its established program for the management and conservation of the fisheries to assure a stabilized maximum yield. Vigilant control over these valuable resources is necessary to prevent unwise exploitation at any time; in a period of emergency which might well extend beyond the anticipated duration of the war into a post-war period, when food requirements will be great, the need for such control is doubly important. Careful observation of fishery runs and escapements in an effort to assure maximum utilization of the resources without endangering the future supply is of the greatest importance. As a result of this management program, seasonal opening and closing dates, weekly closed periods, and gear restrictions, were adjusted from time to time to permit additional catches of salmon and other fishes in such quantities as observations indicated were wise.

Because of travel conditions, no public hearings were held on the Pacific coast on proposed changes in fishery regulations, though such hearings are customary. In the circumstances the industry was invited to submit recommendations for changes in the regulations to the Director of the Fish and Wildlife Service for consideration in the preparation of the 1943 regulations.

In protecting the fishing grounds, eight patrol vessels and five small high-speed boats were used in 1942, effectively supplemented in several districts by Government-owned airplanes. Four of the patrol boats previously used in this work were taken over by the armed forces. The personnel identified with fishery protective work numbered 105, as compared with 190 in 1941. They included fishery management agents, stream guards, weir operators, vessel crews, and biologists. In addition, nine wildlife agents of the Alaska Game Commission, deputized to enforce the Alaska fishery laws and regulations, were active during the fishing season in patrol work.

Weirs for counting escapement of spawning salmon were operated in seven representative streams, and biological investigations concerning the salmon and herring were continued on a limited scale.

Although every effort was made by the Fish and Wildlife Service to insure the maximum possible utilization of fishery products consistent with conservation requirements, in order to meet heavy demands especially for canned salmon for military rations and for lend-lease requirements, the yield of these products did not reach the high level of 1941. The principal causes for the decreased production in 1942 were manpower shortages, transportation difficulties, loss of floating equipment by operators to military agencies, and to a great extent, actual military operations in parts of central and western Alaska which prevented full-scale fishing.

Plans have been tentatively formulated for post-war activities in connection with the management of Alaska fishery and fur-seal resources. Briefly, they will include more efficient patrol facilities; bases in Alaska for repair, maintenance, and storage of patrol vessels; investigations of fishery resources now not utilized; an extensive program for the improvement of existing spawning areas and their tributary waters; and expansion of the Government-owned byproducts industry on the Pribilof Islands to include a plant on St. George and an enlarged factory on St. Paul Island where fur seal carcasses and blubber may be reduced to valuable meal and oil.

The total output of Alaska fishery products in the calendar year 1942 was 306,013,424 pounds, valued at \$56,507,699, compared with 431,125,520 pounds, valued at \$63,477,295 in 1941. The estimated

value of the catch to the fishermen was about \$17,429,700, or more than 2 million dollars more than in the preceding year. The number of persons employed in the various branches of the fisheries was 23,216.

Salmon products represented about 83 percent of the weight, and about 90 percent of the value, of Alaska fishery products in 1942. Almost 93 percent of the salmon products consisted of canned salmon, the pack amounting to 5,075,866 cases, or 236,524,688 pounds, valued at \$48,298,913. Compared with the pack in the preceding year, the output of canned salmon in 1942 showed a decrease of about 27 percent in quantity and about 14 percent in value. One hundred canneries were operated, nine less than in 1941, and the number of persons employed decreased from 21,994 to 19,946.

In the herring industry, the number of operating plants was reduced from 13 in 1941 to 4 in 1942. This decrease was due to curtailed operations in southeastern and western Alaska and to consolidation of those in central Alaska. Production of salt herring and oil and meal was substantially reduced.

Halibut landed by the Alaska fleet, which comprises American vessels landing more than half of their catches at Alaska or British Columbia ports rather than in the United States, totaled 25,387,000 pounds, valued at \$3,555,000. In 1941, comparable figures were 15,984,120 pounds of halibut valued at \$1,552,658.

Several of the minor fisheries showed a considerable gain over the previous year due to increased demands, especially for trout, sablefish, sharks, and clams, but the catch of cod, flounders, rockfishes, "lingcod", and shrimps declined to a marked degree.

NATIONAL WILDLIFE REFUGES

Despite the war and its checking effect on the national wildlife refuge program through the loss of trained personnel and of funds such as formerly had been expended in furtherance of the program, the wildlife refuges have played an important part in the Nation's wartime economy. The complete shut-down of CCC camps, WPA projects and other work relief programs, and the restrictions on construction to save critical materials for war necessitated drastic changes in the job of developing lands for wildlife.

Personnel turn-over has been high, and approximately 20 percent of the trained men of the Division of Wildlife Refuges have gone into the armed forces or into defense industries. While the services of these keymen have been lost to us for the duration, the training program of the Division has enabled us to replace them with subordinates.

Fire protection of valuable timber and grazing resources, forest industries, and strategic facilities on refuge areas was placed high on the list of major objectives and a special allotment of funds under the Sixth Supplemental Defense Act of 1942 enabled us to keep fire losses in forest and grazing areas to a minimum in the zone in which its expenditure was authorized. However, the loss of CCC and WPA personnel in forest fire suppression activities was keenly felt.

Flood damage of serious proportions resulting from heavy precipitation occurred on refuge developments in the West and Middle West, and in some instances extensive, costly repairs are necessary in order to replace damaged structures, dikes, and other water-control facilities.

As a result of management studies, it has been found possible to permit increased utilization of range lands within waterfowl breeding areas without reducing production on the nesting grounds. As a matter of fact, the more abundant rainfall in the Northern Great Plains region has so increased the density of nesting cover that light fall and winter grazing of nesting habitat has been found desirable in maintaining the coverts in a condition most favorable to the waterfowl. These modifications are of particular significance during the present national emergency when there is an increased demand for meat production.

Protective maintenance measures have resulted in extending the life of such equipment as trucks, cars, tractors, and draglines; and the restricted use of automobiles and the release of thousands of tires by the Service have undoubtedly been a material aid in the rubber conservation program.

The following areas were established as national wildlife refuges during the year: Chassahowitzka, an area of 3,156 acres in Hernando County, Fla., designated for the protection of migratory waterfowl (Public Land Order, June 15, 1943); Slade, an area of 3,000 acres in Kidder County, N. Dak., acquired through the bequest of the late George T. Slade, noted wildlife conservationist; Chincoteague, 8,809 acres of some of the finest resting and wintering waterfowl lands in Accomac County, Va.; and Skagit, an area of 2,518 acres in Skagit County, Wash., for resting and feeding waterfowl.

The Hailstone National Wildlife Refuge, an easement area of 2,655 acres in Stillwater County, Mont., for breeding waterfowl, has been administered as a refuge for some time but was only recently covered by Executive order (E. O. December 31, 1942).

One public land order, June 18, 1943, revoked the Matanzas National Wildlife Refuge due to a decision by the General Land Office that no Federal lands were included.

TABLE 3.—*Classification and acreage of national wildlife refuges administered by the Fish and Wildlife Service, June 30, 1943*

Classification	Number	Acrea
For migratory waterfowl.....	188	2,971,381
For other migratory birds and general wildlife.....	25	3,982,589
For colonial nongame birds.....	44	185,677
For big game.....	16	10,578,050
Patuxent Research Refuge, Md.....	1	2,623
Total.....	274	17,630,320

¹ Decrease under last year's tabulation due to dropping Siskiwiit Refuge, Mich. (added to the Isle Royale National Park), Matanzas Refuge, Fla. (General Land Office decision), and to the more accurate calculation of project acreages.

² Decrease under last year's tabulation due to more accurate calculation of project acreages.

Land Acquisition.—Because of the war's effect on land acquisition, most noticeable through the demands for extensive areas by the War and Navy Departments with the consequent need for land valuation engineers, there has been a slowing in the purchase of refuge lands. Marked increases in land prices have also been a retarding factor in refuge-land acquisition. Consequently, such purchases as have been made were almost exclusively limited to those adjacent to lands already in possession to insure their better control.

Although operating with a substantially smaller staff, much attention has been given to the legal and technical prerequisites to the vesting of titles in the United States of previously optioned lands and to the preparation of material for Executive orders establishing the refuges.

The Migratory Bird Conservation Commission approved the acquisition of 13 tracts on 6 refuges, totaling 5,819.26 acres and the lease of 3 tracts on 3 refuges, totaling 3,528.53 acres in 7 States. Most of these lands were urgently needed for the effective completion and administration of existing refuges.

During the year, titles have been vested in the United States to 73 tracts containing 36,378.39 acres in 18 States, and cadastral surveys have been made of 60 miles of refuge boundary and necessary subsidiary lines.

More than 497,500 acres of lands and the crops and physical improvements thereon have been examined, appraised, and type mapped for the Navy Department, the values determined amounting to \$12,116,347.46. For the same Department, 54 miles of boundary and subsidiary lines were resurveyed, and topographic surveys were made of 2,552 acres of land.

Personnel have also been called by the Department of Justice to appear as expert witnesses in the prosecution of condemnation proceedings directed toward the acquisition of certain of these lands.

ECONOMIC INVESTIGATIONS OF WILDLIFE RESOURCES

To assist in the conservation of food and other resources, investigations to improve the methods and materials used in the control of destructive animals were carried on, as were also studies for the improvement of the management of waterfowl, upland game, and other wildlife.

Control methods.—Intensive search was made for substitute rodent and predator poisons to replace strychnine, red squill, and thallium. The war has resulted in a shortage of these materials which formerly were imported in large quantities from French Indo-China, North Africa, and Germany, respectively. A large number of organic and inorganic toxic chemicals was obtained or synthesized for bio-assaying and field testing. Extracts were procured or prepared from numerous native and South American poisonous plants. A few of these have proved to be very toxic and, therefore, worthy of further investigation. In locating new materials, cooperation was obtained from several industrial chemical concerns and drug manufacturers and from various research organizations engaged in the hunt for new toxic agents for other types of pest control.

Good progress was made in adapting one of the newer poisons, zinc phosphide, for control of rats and field rodents. This compound is now in use in various western areas as a substitute for thallium. Other promising new or substitute materials are being extensively tested under field conditions.

Constant effort is being directed toward making highly selective the methods used in control of injurious mammals, and gratifying progress has been made. It was found that birds can be deterred from feeding on poisoned rodent baits by treating the cereal ingredient with a brilliant dye. This treatment does not alter the acceptibility of the bait to rodents, but makes it unattractive to ground-feeding birds. A number of new deterrents were tested to determine their value in protecting packaged foods, ship calking, telephone cables, and insulating material from rats and other rodents.

The practicability of combining an emetic with poisoned baits for rats was successfully demonstrated. This finding is expected to have far-reaching effect in operational rat control as the exposing of rat poisons so treated will be much less dangerous to dogs, cats, and other pets.

Red squill supplies.—The application of the red squill fortification process developed in 1941 continues to widen. The city of New Orleans' fortification plant, built according to Service specifications, is operating successfully, making possible the conversion of large quan-

tities of low-grade squill into a usable control product. Without fortification, much of the squill imported has a low raticide value. The British and Chinese governments, at their requests, have been supplied with specifications for construction and operation of fortifying plants.

The propagation of red squill in this hemisphere received further impetus through consummation of an agreement with the Bureau of Plant Industry, Soils, and Agricultural Engineering, and through initiation of a propagation program in Mexico by the Board of Economic Warfare. In connection with these developments the Service is giving technical assistance pertaining to the toxicity of squill stocks, and to the use of squill in rat-controlled programs.

Marsh management.—Coastal dim-out regulations forced the abandonment of continuous 24-hour burning as a marsh-management technic in the Gulf Coast region. After demonstrating the need for controlled marsh burning to increase the growth of desirable vegetation as food for cattle, fur animals, and other wildlife, limited approval for such operations was obtained from defense authorities. Continued progress was made in demonstrating the utility of regulated grazing on Gulf Coast marsh areas dedicated to wildlife preservation. Assistance was given to interested groups in the development of new war-time markets for marsh products and byproducts.

Control of pest plants.—Giant cut-grass (*Zizaniopsis*), a troublesome pest in southern marshes, was found to be 90 percent controlled by one under-water cutting during the period of maximum runner growth, which, in the latitude of Reelfoot Lake, Tenn., is usually in late August. Spatterdock (*Nymphaea*) was 85 percent controlled by under-water cuttings in June, late July, and August. More than 90 percent control of lotus (*Nelumbo*) was accomplished by one under-water cutting in water 5 feet deep during the period of maximum flowering. The planting of desirable competitor species following control was the subject of experiment to determine its practicability as a measure for preventing or retarding return of pest species. Granular 48 percent muriate of potash gives promise of being valuable for control of a common rush (*Juncus acuminatus*), which is sometimes a weed pest in shallow ponds.

Propagation of waterfowl foods.—The effects of various commercial fertilizers on the growth of important duck foods were investigated under controlled conditions in experimental ponds. Light fall burning was found to stimulate germination of seeds of a variety of important moist-soil grasses and sedges.

Upland game-bird management.—Technical assistance was rendered to the game departments of 18 States in connection with their upland game development and research programs. Diets for the bobwhite

oil consisting of materials available under wartime conditions were formulated and tested.

Wildlife of forest and range.—Investigations of forest-game management practices in the Southeast with emphasis on the preservation of the wild turkey were concluded. In cooperation with the State of Texas, investigations were begun of land-management and grazing practices affecting economically important game resources in the Edwards Plateau, the center of the Nation's mohair industry.

A study of overpopulated deer range in Nevada yielded information which management recommendations were made to the Nevada Game Commission and to the Federal Forest Service. Sample areas showed an average of 4 and 16 deer per 100 acres on summer and winter ranges, respectively. On wide areas, livestock and deer ranges are seriously overutilized.

Pocket gopher investigations on the Grand Mesa, Colo., in cooperation with the Forest Service, determined average populations of 21½ per acre on meadows, 8½ on sagebrush types, and 30½ per acre on open parks. These rodents, on the basis of test plots, were taking as much forage as the allotted range cattle. The costs of control may prove uneconomic unless slow population recovery justifies spreading the operations over several years. Long-time projects in Mississippi, Oregon, Montana, California, and Arizona were placed on a maintenance basis for the duration of the war.

FUR ANIMAL PRODUCTION

Because of the war, basic research in reproduction, nutrition, and fur fibers has been greatly reduced. A special effort is being made, however, to keep the work alive so that continuity can be maintained. During the 1943 breeding season, experiments were conducted to determine whether delayed implantation is a controlling factor in the length of gestation in mink. Investigations were continued to determine the optimum time in the ovulation period to breed foxes. The unit at Swarthmore College cooperated with the U. S. Fur Animal Experiment Station at Saratoga Springs, N. Y., on this work.

Nutrition studies.—Work was continued at Cornell University, Ithaca, N. Y., to learn more about possible substitutes for raw meat in the rations of fur animals. Raw carcasses of foxes proved entirely satisfactory when comprising 25 percent of the ration.

Preliminary results obtained with the nitrogen balance method indicate that the amount of protein in the ration necessary to maintain equilibrium in foxes lies between 7 and 10 percent. The minimum requirement of thiamin chloride (B₁) necessary to prevent B₁ deficiency symptoms in the fox lies between 0.7 and 0.8 gm. per gram of

dry food. The U. S. Fur Animal Experiment Station, Saratoga Springs, N. Y., cooperated with the Cornell unit to make these determinations. The minimum requirements of calcium for growing pups were tentatively determined to be between 0.4 and 0.5 percent of the ration. The vitamin-A requirements of growing pups were studied with 70 animals after a depletion period of 29 to 41 days.

Fur fiber studies.—In cooperation with the Bureau of Animal Industry, studies were continued on the fur fiber characteristics associated with woolliness in domestic rabbits.

Karakul fur investigations in cooperation with the Bureau of Animal Industry have been continued on a very reduced scale. The final step of one phase of the breeding program was taken this year in the production of broadtail lambs by crossing the Karakul and Navajo sheep. The pelts produced were of good quality.

New York fur animal experiment station.—The scarcity of animal proteins seriously affects the production of fur animals as the food is largely composed of meat and meat products. Experiments were conducted at the station near Saratoga Springs during the past year to adapt rations of fur animals to the present emergency conditions. It was found that beef meal can be used to replace half the raw meat in the summer mink ration. Preliminary studies indicate that soybean meal, cotton seed meal, corn gluten meal, and peanut meal can be similarly recommended.

Maryland fur animal field station.—A 5-page leaflet on "Recipes for Cooking Muskrat Meat" proved useful in the Service's campaign for increasing the use of the meat of furred game. The 6,000 muskrat carcasses graded and sold from the 5,233-acre marsh area near Cambridge, Md. brought as much as 35 cents per carcass wholesale in the Baltimore market. Approximately 60 mature muskrats, 10 nutria, and 4 raccoons are maintained in pens at the station for controlled experiments. A total of 49 litters of muskrats was born in pens during the year, the number of litters per female running from one to four in a season. The period for gestation for muskrats is believed to be 28½ days.

California rabbit experiment station.—Results from experimental work and cooperative relationships already established furnished the basis on which was developed a program for increased rabbit production. Rations containing less protein and a smaller proportion of concentrates are being studied. Hutches and accessory equipment construction requiring less critical materials are being emphasized. Studies have been made of the food conversion ability of rabbits of various ages, the effect of the woolly carrier on pelt values, cause of sore hocks, and malocclusion of teeth.

The staff at the station has devoted considerable time to answering correspondence and supplying information to those interested in raising rabbits to supplement the dwindling family meat supply. Informative material was sent to every State in the Union and to 30 foreign countries.

WILDLIFE DISEASE INVESTIGATIONS

Fur animal diseases.—Tests of six species have been conducted to determine the susceptibility of wild animals to distemper virus and thus ascertain whether they may serve as carriers of the disease. Muroid enteritis kills many domestic rabbits, and every effort is being made to determine the cause of the disease and to prevent losses from it.

Game bird diseases.—Control of avian botulism, the most devastating of waterfowl diseases, is being attempted on an experimental basis at various Federal refuges through manipulation of water levels. The value of salvaging the affected waterfowl was demonstrated conclusively by comparison of mortality figures for sick birds that had been hospitalized, banded, and released and for those that had not been hospitalized before released. The former show a much higher rate of complete recovery.

Demonstration was made of botulism toxin in the blood stream of sick ducks picked up in the field. By the use of movable duck cages it was possible to demonstrate the presence of toxin in very shallow water which was rich in organic matter. Likewise maggots from birds that had died of botulism were found to be highly toxic and the soil under the carcasses was found to remain toxic for more than 40 days. Studies were also made on the relationship of other soil and aquatic organisms to the botulism bacteria.

Identification of the causative agent of quail rhinitis as a filterable virus verifies a theory of long standing as to the nature of this infection. Cultivation and serial transmission on chick embryos provides means for the development of prophylactic control measures.

COOPERATIVE WILDLIFE-MANAGEMENT RESEARCH

The 10 widely distributed Cooperative Wildlife Research Units were chiefly engaged during the year in surveying game populations, estimating surpluses that could be safely taken for meat and fur, studying game depredations upon farm and range crops, and investigating factors affecting game supplies. Of 87 projects, 23 were completed and 38 were suspended because the investigators entered the armed forces. Research, training, and extension programs were actively carried on in Alabama, Iowa, Maine, Missouri, Ohio, Oregon, Pennsylvania, Texas, Utah, and Virginia, at the land grant colleges,

cooperating with the State game commissions and the American Wildlife Institute. Unit leaders acted as advisors to State game departments on conservation matters. In cooperation with the Texas Agricultural Extension Service, a 5-year wildlife extension program was completed in 221 of the 254 Texas counties, with more than 36,000 owners participating on approximately 21 million acres of land.

MIGRATORY BIRD INVESTIGATIONS

The waterfowl situation.—Continued favorable climatic and environmental conditions, and adherence to a sound management policy, have resulted in further increases in the continental population of ducks and geese. In 1943 fall migration of these birds should be the largest in several decades. Shortage of ammunition and transportation, the departure of many hunters for the armed services or the war industries, together with other factors, are likely to reduce hunting pressure. In consequence, prospects are excellent for the building up of a stock of birds that will fully occupy the available habitat. Because of this there is a pressing need to provide adequate winter quarters where food supplies will be ample. This condition is particularly acute on the Atlantic and Mississippi Flyways.

Investigations in Canada.—Despite difficulties encountered in reaching (without the aid of automotive transportation) the out-of-the-way lakes, marshes, and river valleys that are frequented by waterfowl, the biologists of the Atlantic and Mississippi Flyways succeeded in covering important concentration areas in the Maritime and Prairie Provinces of Canada. Much of the success of the waterfowl operations in that country must be gratefully attributed to the wholehearted cooperation of Dominion and Provincial game officials, and to others interested in the welfare of the birds. In addition to the information obtained directly by the Service biologists, the Canadian National Parks Bureau has made available the reports of its officers stationed in the Prairie Provinces and in British Columbia.

In Manitoba, Saskatchewan, and Alberta there were some losses caused by nest flooding, late freezes, and predatory animals, but the total was far less than losses a few years ago from drought. The biologists conclude that the prairie region of Canada has a substantial increase in its population of ducks and geese. Similarly, high water in the Maritime Provinces did some damage to early nests of the important black duck, but renestings were sufficiently numerous to produce a normal crop. An increase of waterfowl also was recorded in British Columbia.

The leader of the Maine Cooperative Wildlife Research Unit, operating in Quebec and New Brunswick during the month of August

1942, submitted a report upon the comparative status of the waterfowl in these two Provinces. While Quebec is not known to have extensive breeding grounds, there are important nesting areas in New Brunswick. Unmistakable evidence was found of a continuing increase in the number of ducks, particularly of the blue-winged and green-winged teals.

Investigations in Newfoundland.—In collaboration with the Department of Natural Resources of Newfoundland, two biologists of the Service worked in this crown colony during the month of June 1942, obtaining series of specimens and useful information on the avifauna of the island. Important elements of the Canada goose population of the Atlantic Flyway appear to have their breeding grounds in this region.

Investigations in Alaska.—Through the cooperation of the Alaska Game Commission, the biologist formerly assigned to the Mississippi Flyway, but now attached to that agency, was transported by air to the delta of the Yukon River where headquarters were again established at the village of Chevak. Work on the great waterfowl breeding grounds was just under way when it became necessary to suspend operations and send the Service representative to Washington on an urgent mission. Subsequent information, gathered by agents of the Alaska Game Commission, indicated that the numerical status of the Alaskan population of breeding waterfowl was generally satisfactory although the supply of geese appeared to be somewhat below normal.

Investigations in Mexico.—For the purpose of filling a gap in our knowledge of waterfowl wintering grounds in Mexico, the biologist of the Pacific Flyway devoted 6 weeks to a survey in the State of Chihuahua. The number of ducks and geese wintering in that district does not appear to be large and its importance is much less than that of previously surveyed areas on both coasts and in the Valley of Mexico. It is, however, one of the chief wintering grounds of the sandhill crane, a migratory game bird that for many years has been accorded complete protection, and has distinctly increased in numbers.

The biologist of the Central Flyway, from his headquarters at Brownsville, Tex., made several short trips into the State of Tamaulipas to study the wintering waterfowl in the Mexican portion of the Laguna Madre. War conditions made it necessary to dispense with aerial surveys over coastal areas of this country.

Investigations in the United States.—Breeding grounds in the northern United States continued in excellent condition. Abundant water filled sloughs and pot holes that had been dry for years. These additional nesting areas resulted in a greater dispersal of the birds so that on some of the refuges there appeared to be a reduction in

numbers. This necessitated extending investigations to adjoining areas.

Seasonal comparisons of the constantly increasing numbers of ducks and geese have become increasingly difficult, probably because the average observer, while fully competent to estimate the size of flocks that may contain only a few hundred individuals, finds such estimates extremely difficult for flocks composed of many thousands. The fall migration of 1942 was reported on by 305 observers, and the spring flight of 1943 by 252. Analysis of these data aided materially in appraising the status of the different species.

During the winter months and the migration seasons the flyway biologists maintained continuous surveillance on the great flocks of ducks and geese that annually gather in the South Atlantic and Gulf coasts and in the interior valleys of California.

Despite war conditions, both the Navy and the Coast Guard were able to render splendid cooperation in the taking of the annual inventory in January, furnishing sufficient aviation to assure coverage of most coastal areas. As a result of this operation it was estimated that the continental population of ducks and geese has increased to between 115 and 120 millions. A few species, such as the redhead and the ruddy duck, while showing gratifying increases, are still below the desired levels.

Status of other migratory game birds.—Investigations of the woodcock were continued in Maine and Pennsylvania, and in the Canadian Provinces of New Brunswick, Nova Scotia, and Prince Edward Island. While numerical recovery of this bird from the low point of a few years ago, now seems assured, nevertheless it is also apparent that wise management demands very cautious utilization.

Such data as were obtained indicated a further decrease in the number of the Wilson's snipe. From only two States, Florida and Louisiana, was there any evidence of a possible increase.

The mourning dove, on the other hand, is making a most gratifying recovery, particularly in the East where its numbers have been at low ebb. They are, however, still much below the optimum desired.

Due to the necessity for detailing the biologist of the Central Flyway to part-time work with the Office of the Coordinator of Fisheries, the investigation of the white-winged dove in Texas has been extended throughout the breeding season of 1943. Work with the western race in Arizona has been rounded out by a special study made during the summer of 1942 in the Mexican State of Sonora. As a result of this research, better management of the species should be assured.

Banding game and other birds.—The banding work has been severely restricted as a wartime economy. Many volunteer cooperators have

entered the armed forces or by virtue of their occupation in war industries have been obliged to close their stations temporarily. New permits have been issued only in exceptional cases and practically all work with species that nest in colonies has been suspended in order to conserve bands urgently needed for work with game birds. Nevertheless, the 1,700 cooperators reported the banding of 177,898 birds, of which 30,783 were ducks and geese. The grand total of birds banded since the beginning of the work is 4,528,241. Returns and recoveries totaling 22,774 brought the total of these data to more than 315,000. This file is a veritable "treasure trove" of new information regarding North American birds and is being widely used for a variety of purposes.

Distribution and migration records.—Two hundred and eighty-six volunteer observers sent in 36,210 migration observations to be incorporated with the already vast and invaluable collection of this material. In addition, 630 locality, and 710 publication, references were added to the files.

BIOLOGICAL INVESTIGATIONS OF WILDLIFE

National park wildlife.—Study of beaver-elk relationships in Rocky Mountain National Park shows that the numbers and distribution of beavers are controlled, to some extent, by elk since the latter relish aspen on which beavers are dependent. Maintenance of natural areas in which beavers may work out their own destiny should prove valuable as a check on trapped areas and on domesticated fur animals. Since serious overpopulations of deer exist on certain areas in Kings Canyon and Sequoia National Parks, the need for trapping is indicated to prevent further damage to browse plants. Data were supplied to the National Park Service regarding wildlife of Jackson Hole National Monument, particularly in relation to the adjacent National Elk Refuge and the need for reduction of the southern elk herd.

Surveys were made of winter range for elk and other large mammals in Yellowstone National Park and elk reduction methods were studied at first hand in order to get information for use in future management plans for the northern elk herd. Range conditions in Rocky Mountain National Park are not as bad as in Yellowstone but show heavy use by deer and elk which are cut off from their former winter range outside the park. Reduction of the number of sedentary individuals by official means within the park appears necessary. A survey of pack and saddle stock grazing in a primitive section of Kings Canyon National Park showed that range conditions are, in general, good.

An inventory was made of rare fur-bearing and other mammals in border areas of Kings Canyon National Park, adjacent to the trap-

ping district. Possibilities for development and recreational use of wildlife at Denison Dam and Reservoir, Texas-Oklahoma, were studied. Information on wildlife resources of the Alaska Highway will be used in planning development of a protected strip along the road in Alaska. Investigation was made of moose and other wildlife of Isle Royale National Park.

Assistance was given in preparation of the National Park Service's report on present and potential contribution to the departmental food production program and in carrying on that for increased utilization of grazing and general agricultural resources. Study shows that sizable meat contributions have been and can be made through official slaughter of elk, deer, and buffalo to remove existing surpluses.

Investigation of aquatic resources in Lassen Volcanic National Park was made and studies of trout populations in Yellowstone and Kings Canyon National Parks were continued. It is the purpose of these studies to develop plans for management of park waters based on their physical, chemical, and biological characteristics. Special attention has been paid to lakes since they provide most of the fishing and offer the greatest opportunity for improvement of angling through proper management. However, with the decreased fishing intensity, there is less need for such studies at present and they will be discontinued until after the war. Fish for planting of park waters were supplied from Federal hatcheries. Hatcheries were operated in Glacier, Great Smoky Mountains, and Yellowstone National Parks. Eggs collected from Yellowstone waters and young fish were planted in national park and other public waters.

Federal refuge faunas.—An investigation of the Wichita Mountains Wildlife Refuge, Oklahoma, showed that the meager surplus forage which existed was not situated so that it could be used for grazing domestic livestock without seriously interfering with wildlife management. As a war economy, however, the better part of this surplus can be cut for hay without seriously disturbing conditions for wildlife. The herd of introduced pronghorn antelopes now numbers about 60. On the Sheldon National Antelope Refuge, Nevada, investigations were made of winter conditions in relation to game animals and of competition between wild game and domestic stock. A study was made of the 2,606 winter elk losses in the Jackson Hole region, Wyoming, of which 1,175 were on the National Elk Refuge. Many of these losses on the refuge were from necrotic stomatitis induced by the presence of squirrel-tail (*Hordeum jubatum*) in the hay, while those in the hills probably resulted from malnutrition on an overbrowsed range.

Other field and laboratory studies.—Because our scientists were engaged in war activities, little field progress was made on the biological survey of the State of Washington and none on those of other States. A report on a biological survey of the Aleutian Islands that has an important bearing on our war effort and reconstruction work neared completion. Continued studies of the marten were made in cooperation with the State of Montana, and a manuscript was in preparation on the habits, history, economics, classification, and distribution of American pumas. From surveys, an estimate of 6,748,414 big-game animals in the United States was made at the close of 1941, and a manuscript was completed for publication on "Our Big-game Resources, 1937-42," which discusses populations of big-game animals, their trends, and their relations on different classes of land. Consideration was given to the land-use aspect of the Alaska wildlife problem and to an inventory for major vegetative types of South-eastern Alaska and administrative reports thereon were made.

The Biological Survey's laboratories were used by more than 150 cooperative investigators, including many from the War and Navy Departments, the Office of Strategic Services, and the War Production Board. These investigators made use of our original maps and reports and were supplied with bibliographies and other material; and our scientists gave them information which was not procurable elsewhere.

A LOOK AHEAD

True conservation demands that consumption shall not exceed production. Even wartime pressures should not result in exceptions to this rule and if the policies of the Fish and Wildlife Service prevail, there will be no deviations in its field from this basic principle of sound animal husbandry. Previous wasteful handling of natural resources has again been made apparent by the great needs developed in the present war. Continuation of such waste would be suicidal. Hence conservation, in all of its phases, undoubtedly will be a major national objective after the war.

Doing post-war planning now is of great importance and it has been given attention not only by the Fish and Wildlife Service but, at our request or instigation, by State conservation departments and by sportsmen's organizations and other interested groups. Within the Service, planning has embraced improvement of ordinary activities and also a program of development for lands now in administration or to be acquired, which will provide widespread employment and advance wildlife conservation to new and greater levels.

Unnecessarily as well as necessarily, we have expended a great deal of wealth that we shall be unable to replace. On the other hand, wildlife fortunately is a renewable resource which, with proper management, cannot only be maintained but increased. Preserving it and at the same time profiting by conservative use of it is a great economic achievement—in fact it is one that should gratify the most practical-minded. Beyond that, successful conservation of some of our wildlife heritage for its own sake is an out-standing aesthetic accomplishment in which every citizen can take satisfaction.

Office of The Coordinator of Fisheries

IRA N. GABRIELSON, Deputy Coordinator

AMERICA'S fisheries have been called upon to produce their high-protein foods and their essential byproducts on an unprecedented scale during the war. So great is the need for canned and fresh fish, fish meal, and vitamin oil and industrial oils, that the industry has been asked to produce 6 billion pounds in 1943—more than a billion pounds in excess of its largest peacetime yield.

The fishing industry has felt the impact of war more than any other enterprise of comparable importance. Because its working tools and its manpower are peculiarly useful in actual military operations, its materials as well as its men were called into service early in the war. In some branches as many as half the vessels were requisitioned for coastal patrol, and for transporting munitions and food to defense outposts and theaters of combat. The hard fiber ropes and twines with which fishermen operate their boats and gear went to war on troop ships, warships, and cargo vessels. Fishermen's nets found a new and invaluable use in camouflage-operations. Putting to work their knowledge of the sea and their skill in handling boats, many fishermen entered the Navy, the Coast Guard, and the Merchant Marine.

The procuring of food and the essential byproducts of the fisheries, are also important wartime functions of fishermen and their boats and gear.

The Office of the Coordinator of Fisheries was established by Executive Order 9204, July 21, 1942, to give the fishing industry needed aid in solving its war-created problems. The Secretary of the Interior was designated Fishery Coordinator, and the Director and Assistant Director of the Fish and Wildlife Service later appointed by him as Deputy and Assistant Deputy Coordinator respectively. Authorized under the original order to assure the sustained production of aquatic food supplies and to coordinate fishery policies, plans,

and programs, the Coordinator of Fisheries received further authority over the production and processing of fishery products under Food Directive No. 2, issued by the Secretary of Agriculture on February 8, 1943.

To carry out these functions effectively the Coordinator's Office is organized on an area basis with a representative in each of 10 major commercial fishing areas in the United States and 1 in Alaska, and consultants have been appointed from the fishing industry. The central office personnel and field staff are members of the fishery divisions of the Fish and Wildlife Service, detached temporarily from their ordinary duties for this wartime service.

GAINS MADE IN TWO FIELDS

During its first year the Coordinator's Office has accomplished substantial gains in two principal fields: (1) providing or retaining the men and materials to carry on the work of fishing, and (2) assisting the industry in using its facilities at maximum efficiency in order to bring in every possible pound of fish.

The return of fishing boats no longer urgently needed by the Army or Navy is essential if the fishery yield is to be increased. Early in 1943 the return of floating equipment to the Alaska salmon industry was arranged. This permitted the canning of a large pack of salmon which, on June 30, totaled 662,800 cases as compared with 288,786 cases to the same date last year. A number of seiners have been returned to the important sardine and menhaden fisheries, and a few trawlers to the New England banks—a distinct gain to fishery production, since most of these boats are capable of catching 5 to 6 million pounds a year. There is still a critical shortage of boats, and efforts are being put forth to secure the return of additional vessels to active fishing.

The program of fishing vessel construction is progressing satisfactorily. Besides those authorized earlier in a straight preference rating, the Coordinator's Office has secured controlled material allotments for the construction of some 250 vessels. At the present rate, construction will amount to about 20 million dollars per year and will probably increase.

By expediting applications for priority ratings for fishing gear, shore equipment, plant construction, and repair, the Coordinator's Office has helped to clear the bottleneck which has retarded normal repairs and replacements. It has formally recommended for approval priority cases involving material and equipment for repair, replacement, and expansion of fishing gear, fishing boats, and shore

processing plants amounting to approximately one and a quarter million dollars. Authorization has also been granted for the establishment of stockpiles of marine engines in the amount of approximately 800 engines by dealers located in 40 cities. These engines are released on recommendations of the Coordinator's field representatives.

MANPOWER SHORTAGE AMELIORATED

By gaining recognition by the War Manpower Commission of fishermen and skilled labor in processing plants as workers performing a necessary war job, the Coordinator's Office has reduced the loss of manpower which was seriously hampering fishery production. Arrangements have also been made to restore certain classes of aliens to fishing.

Through arrangements with Coast Guard authorities, security regulations in coastal waters have been modified to minimize interference with fishing. Certain bombing ranges, located on highly productive fishing grounds, have been moved to less productive waters. In many instances, port restrictions on the movement of vessels, hours of fishing, and on the use of radio at sea have been modified or removed.

The decentralization of service functions of the Coordinator's Office among the 11 area coordinators has proved very successful. The services rendered by these field offices have been instrumental in adding many vessels to the fishing fleet through new construction and by return from the military services, by securing engines for fishing boats, obtaining priorities on repair materials, fishing gear, and equipment, and arranging for rationed allotments of food and fuel for fishing vessels. The area coordinators have also succeeded in having certain restrictions on fishing activities adjusted with benefit to production and have aided in bringing about the deferment, release from military service, or direct recruitment of a large number of fishermen or shore workers. In many areas they have been successful in promoting the production of new fishery products and in conducting promotional campaigns to increase production.

The Coordinator's Office has developed wartime programs of operation for the salmon and pilchard fisheries, which together account for more than a quarter of our total production of fish. The Alaska salmon industry is operating under a concentration plan, with the canning of salmon confined to 75 of the most modern and efficient plants, assuring effective use of labor and equipment and maximum production. On June 30 the coordinator announced a coordinated production plan for the Pacific pilchard industry, which annually

yields about 1 billion pounds of fish for canned sardines, fish meal, and oil. The pilchard production plan, worked out in consultation with representative fishermen, plant operators, and State conservation officials, is designed to provide an even flow of fish to the canneries and reduction plants. Under the ordinary distribution system, some plants stand virtually idle at intervals for lack of raw material, while others receive more fish than they can process. This year deliveries will be directed by dispatchers assigned by the coordinator to the principal ports.

At the mid-point of 1943, reports from most sections of the industry showed that production was running ahead of last year's figures by a satisfactory margin, justifying the assistance that has been given the fisheries and offering promise of more substantial future gains.

Office of Indian Affairs

JOHN COLLIER, Commissioner

[N REVIEWING the past 12 months, I think first of the Indian men and women in the uniforms of their country's armed forces. Eighteen thousand Indians are in the military services. Thousands fight overseas. Hundreds have already died in this war, and more will fall in the great offensive actions now beginning.

Deep in the jungles of New Guinea, Indian sharpshooters readily see through Japanese camouflage and fight with a ruggedness that has won them acclaim in the press. Indians served well with the armored divisions in the African desert campaign and contributed materially to the final Allied victory. Indian pilots, gunners, bombardiers, and radio operators man Flying Fortresses and other heavy bombers which raid important German industry. In the Mediterranean, in the Atlantic, in the Pacific, in Asiatic waters, Indians have convoyed precious cargo, on sea and in the air, and a few Indians are in the submarine service.

In the great offensive now beginning on European soil, Indians will continue to serve with distinction in almost every military job. These comrades in arms are the sons and grandsons of the toughest enemy we white Americans ever fought.

Their commanders speak highly of their prowess, and they are especially effective when several or more Indians are permitted to serve in the same company or unit. A Cherokee Indian, Lt. Joseph Woody Cochran, of Skedee, Okla., has received four medals: the Distinguished Flying Cross, the Air Medal, the Purple Heart and the Silver Star. Before entering military service, Lieutenant Cochran had obtained an Indian Service educational loan to attend Oklahoma A. & M. College. This year his wife repaid \$300 owing on the loan. Staff Sgt. Frankie Spindler, of Assiniboine Indian blood, who, I regret to report, was killed in action in Africa, received three medals: the Distinguished Flying Cross, the Air Medal, and the Purple Heart. Scores of Indians have received awards for distinguished service.

Some Indian jurisdictions report that 30 percent of the able-bodied men between the ages of 18 and 38 have gone to war; others report 40 percent and some 60 and 70 percent. By far the largest number of those inducted or enlisted are found in the Army. According to the War Department, 16,054 Indians entered the Army between June 1940 and May 1943. Several thousand more are found in the other military branches. More than 100 Indian women have joined the auxiliary military services.

These Army figures do not include Indians commissioned as officers. A few Indians have been wounded and have honorable discharges. A small percentage of Indians who were inducted have been returned to their homes because they did not speak and write English. These boys are more anxious than ever to learn English and they are now receiving special assistance from Indian Service teachers. In the largest non-English-speaking area, the Navajo country, the Wingate Vocational High School offers preinduction training to Navajos who desire to learn basic military English quickly. Army officers from a nearby ordnance depot have introduced military drill and calisthenics at the Wingate school.

INDIANS BACK THE ATTACK

Whenever the Indians hear that their country needs money, they give spontaneously. A Navajo, who had asked his superintendent whether it was true that the Government desired funds to fight the war, stated that he did not want the paper (a war bond certificate) if the Government would buy guns with his money. Eskimos of the little village of Kipnuk, distressed that some of their boys had been sent home because they did not speak and write English well enough for military service, held a meeting and decided they must help win the war. They collected and sent to the Juneau headquarters eight mink skins, one weasel skin, and \$16.50 in cash, left over from the season's trapping. The skins sold for \$118.30, and \$134.80 in war stamps was returned to the village of Kipnuk. Indian employees of the Service buy war bonds through the pay-roll allotment plan, and war stamps are the price of admittance to many tribal social gatherings.

I am unable to report how many millions of dollars the Indians have invested in war bonds and stamps. Only those Treasury bonds purchased with monies under the jurisdiction of the Federal Government are recorded in this office, and purchases in this category by individual Indians and by tribes total 5 million dollars.

Thousands of Indians have left their homes for war work. In the last 2 years, Indian Service vocational schools have trained and placed approximately 2,000 men and women in war industry. Certain war plants in the Oklahoma-Kansas area and on the West Coast have placed standing orders with Indian schools for all Indians who can be trained. Classes are also open to white persons, and age restrictions have been lifted. Many hundreds of Indians to whom Indian Service vocational schools are inaccessible have acquired skills for war employment through local NYA centers.

FOOD PRODUCTION INCREASED

Despite labor shortages and upheavals occasioned by the war, the Indians actually increased their food production in the calendar year 1942. They produced and sold more food during the past year than ever before. Indians in the continental United States raised 21 million dollars worth of food, including beef, fish, poultry, cereals and vegetables. Two-thirds of this was sold on the 1942 market. The rest was consumed at home. Their sales of livestock and livestock products alone totaled \$12,808,244. This compares with top livestock sales of 4 million dollars in the last war when meat prices rose higher and the quality of livestock was generally poorer than obtains today.

On the basis of Army rations, the Indians in 1942 sold enough beef, mutton, poultry and fish to feed 220,250 soldiers for 1 year; enough cereals to feed 367,103; enough potatoes and vegetables to feed 52,057; enough eggs to feed 47,769; enough fruits and tomatoes to feed 38,346; enough beet sugar to feed 42,076 and enough butter and other fats to feed 51,269; finally on the basis of 199 pounds of wool per year, the Indians marketed enough wool in 1942 to supply all the clothing requirements, including replacements, for 19,000 soldiers.

These production figures represent a marked increase in Indian farming operations. In 3 years ending January 1, 1942, Indians planted 150,000 additional acres in grain and cereal crops and enlarged their gardens by 3,265 acres. They also planted new fruit trees, nuts, edible soybeans, and other produce. At the end of 1932, the Indians owned 170,794 beef cattle. Ten years later, cattle holdings had increased to 320,727. During the same period their dairy herds had increased more than fourfold—from 11,314 to 49,468.

Several factors are responsible for this increase in farming activity and the resultant increased production. Prominent among these is the careful planning by Indian Service employees and Indians working together. An example is the contract furnished by the United Pueblos Agency staff to an Indian who is going to war and desires

to assign his farming equipment, land, and livestock to another operator to use in his absence. Under the direction of the Governor and the village council, the new operator agrees to maintain the enterprise, to contribute his share to village relief, and to give to the original owner on his return the same amount of equipment and livestock he owned before leaving.

In 1936, Indian Service employees of the Pine Ridge Reservation sat down with the adult members of the 35 families of the Red Shirt Table community to plan with them a livestock and farming program for the community. At that time the Red Shirt Table community was one of the most impoverished and demoralized communities on the reservation. Long periods of drought and depression had completely liquidated their livestock holdings, and practically the entire community was dependent upon public assistance. Beginning from scratch, this community has developed a livestock industry the net worth of which, at the end of the fiscal year, was approximately \$60,000. This past season they planted and harvested 130 acres of irrigated land, conducted a poultry enterprise which brought them for the year a net income of approximately \$5,000, and have built a community root cellar and a community canning kitchen. The constant planning together of Indian Service employees and members of the community has resulted in the establishment of better community government, more adequate education and health facilities, and has made the entire community aware of its problems and its possibilities for the improvement of their welfare.

TRIBES PLAN FOR FUTURE

On many other reservations similar planning has been going on between Indian tribal councils and Indian communities and representatives of the Indian Service. On the Fort Belknap Reservation these plans have resulted in considerable enlargement of the livestock industry of the reservation, and more effective use of the irrigated lands. On the Flathead Reservation, a program is being developed which will involve the use of tribal funds for land purchases and for the enlargement of credit facilities. On the Warm Springs Reservation, the tribal council has, for a period of 2 years, worked with representatives of the Indian Service in developing a reservation-wide program which includes land acquisition, restocking of certain of the ranges, and more effective control over their fishing industry. These are just a few typical examples of enterprises planned by Indians and Service employees working together.

Another factor responsible in no small degree for increased agricultural production by Indians has been the extension of credit facil-

ities. Up to July 1, 1942, the Federal Government, in cooperation with tribal corporations and credit unions, made 5,019 loans to Indians totaling \$3,186,727 from the IRA revolving credit fund. Repayments were less than 5 percent delinquent at the end of the year. Records of repayments for 1943 have not been compiled yet, but all indications are that fewer Indians will be delinquent in repaying their loans this year than ever before. A number of individuals have paid the interest on their tribal loans 2 years in advance, and some have paid 3 years in advance.

Another factor has of course been the increase in actual acreage of Indian lands through purchases and through the restoration to the tribes of lands once ceded to the Government to be opened to entry. Only a small amount of gratuity funds were appropriated for land purchases for the fiscal year 1943, but a number of tribes have continued to invest their tribal funds in sorely needed land.

While Indians are not ordinarily thought of as dirt farmers, the chief contribution the American Indian has made to American civilization is probably his agricultural plants, methods, and processes. Indians discovered methods of bringing wild plants under control and breeding them by seed selection long before the advent of the white man. Paramount among the food plants domesticated and developed by Indians and given directly or indirectly to the white man is corn, or maize. Others include the white potato, originally grown by the Indians in the Andes; tobacco; the many varieties of kidney and lima beans; cocoa; peanuts; pumpkins; squash; sweetpotatoes and tomatoes. It has been estimated that four-sevenths of the total agricultural production in the United States, measured in farm values, consist of economic plants domesticated by the Indians and taken over by the white man.

MRS. DANIELS, 89, DOES HER BIT

This contribution of Indians to agriculture is not entirely a matter of past history. Within the past 5 years horticulturists have developed the only variety of lima bean yet known to grow satisfactorily in high, dry country. The original seed for this new lima bean was contributed by an 89-year-old Navajo woman, Mrs. Rose Daniels.

Five years ago a representative of the Horticultural Field Station, Cheyenne, Wyo., visited Mrs. Daniels at her home on the Uintah-Ouray Reservation, Utah. In her odd little seed house, Mrs. Daniels showed the scientist bottles and cans filled with seeds that she had saved during most of her life. As a child, Mrs. Daniels had been stolen from the Navajo by the Whiteriver Apaches and sold to the Uintah Indians and finally to a Mormon pioneer, a Mr. Daniels of

Fort Bridger, Wyo., who later settled with her on the Uintah Reservation. Mrs. Daniels has gardened successfully during her long life, growing a variety of vegetables in a homemade irrigated plot. She had only three lima beans remaining in her seed can, but the scientist wrapped them carefully and took them to the experiment station. From this small beginning was developed a new variety of lima bean placed on the market for the first time this year. The bean is especially adapted to the short growing season of the high dry country of such areas as eastern Utah, Wyoming, and South Dakota.

The first rabbit brush to leave the State of Nevada last year for rubber experimentation was collected by Indian agricultural students at the Carson Indian School. The boys used homemade balers and baled a sufficient quantity of rabbit brush to enable the United States Tire Co. to make extensive tests for rubber content.

During the past year irrigation supplied water to some 540,000 acres of farm land on Indian reservations west of the Mississippi River. These lands, used by Indians and non-Indian farmers, have been devoted to the production of critical food crops urged by the War Food Administrator for the western area. The combined value of food produced on Indian-irrigated land amounted to 20 million dollars in 1942. In addition, power systems operated by the Indian Service in connection with these irrigation projects furnished 35,000 kilowatts, either directly or by interconnection, to copper and molybdenum mines, numerous manufacturing plants, city utilities, and other commercial and industrial consumers in the rural West. The San Carlos and Colorado River projects furnish power to relocation centers settled by 30,000 Japanese-Americans who had been removed from the West Coast, and also to an army camp in Florence, Ariz., where prisoners of war are interned.

In a recent report of the Department of the Interior to the War Food Administrator, the Indian Service submitted plans for irrigating an additional 156,500 acres of Indian land over a 5-year period at a total cost of 16 million dollars. If adopted, the program would provide for increased food production valued at \$7,601,000 the first 2 years of operation and would also create post-war employment and farm areas for ready occupancy by Indians returning from the war and from industrial centers.

LAND YIELDS WAR MINERALS

A number of essential war minerals are obtained from Indian lands. Lead, zinc, oil, and gas are produced in large volume. Copper, vanadium, asbestos, gypsum, and coal are produced in small quantities.

The Indian Service has responsibility for general oversight of mineral production on Indian lands. Some of the technical phases are handled by the Geological Survey. Certain aspects are subject to final approval by the Secretary. The scope of this work is indicated by the volume of business handled during the fiscal year, which included: Approval of 900 mining leases, the issuance of prospecting permits covering many thousands of acres, the development and approval of plans for the commingling of ores in order to increase production, the sale of certain tribally owned deposits of coal to the Defense Plant Corporation, and the assignment to the United States of an oil lease for Indian land on which a deep-test well revealed the presence of helium gas. Revenues to the Indian owners of these minerals thru royalties, rentals, and bonuses are estimated to exceed 5½ million dollars yearly.

The Indian Service, in cooperation with other Government agencies and with the Indian landowners, is encouraging the discovery of new deposits of strategic minerals, increased production from known reserves of low-grade ores, and the introduction of simplified procedures to make mineral deposits immediately available.

WOMEN IN LUMBER MILLS

From Indian-owned forests this year came timber for war construction totaling almost a half billion feet valued at 2 million dollars. Included are the Sitka spruce used in the construction of training planes, elm and oak, from which the ribs of ships are hewed, and Douglas fir and Western hemlock, which go into plywood for airplane construction.

A significant source of lumber in the Great Lakes area is the Menominee Indian Mills, Inc., at Neopit, Wis. As 200 Menominee men serve in the armed forces and others are away from the reservation in war jobs, production of lumber had to be curtailed until Menominee Indian women were called to replace the men.

May 3, 1943, marked the first time women ever worked directly in Menominee mill operations. Thirty Indian women made possible the return of the second shift which was discontinued for 3 months because of the manpower shortage. The women have learned to pick and sort stock, work on the chipper, and bundle lath. They also do general clean-up work in the mills and cooking in the lumber camps. About 50 additional women will be available for mill jobs this fall if plans for a nursery school can be carried out.

More than 50 Menominee women have been regularly employed to work in the forests, carrying out the blister rust eradication program

which was formerly manned by Indian CCC employees. They are driven to the work by Indian women truck drivers.

BOMBING RANGES PROVIDED

Over many thousands of acres owned by Indians, few white men have trod. The War Department has found much of this land suitable for bombing ranges, airports, and other military uses because of the poor quality of the land and its remoteness from centers of population.

More than 400,000 acres on the Pine Ridge Reservation, South Dakota, were sold to the War Department for bombing ranges, necessitating the evacuation of 128 Sioux Indian families. These families were safely moved to new homes on recently purchased land and credit has been extended to them for the purchase of cattle and farming equipment. Smaller tracts of land have been sold or leased to the War Department on the Kiowa Reservation, Oklahoma; on land belonging to the Five Civilized Tribes, also in Oklahoma; on the Tulalip Reservation, Washington; on the Pima and Papago Reservations, Arizona; on Pueblo lands, New Mexico; on the Blackfeet Reservation, Montana, and on the Fort Hall Reservation, Idaho.

The road-building program of the Indian Service during the past year was restricted to the construction of roads leading to vital war materials. The completion of a road to a vanadium mine on the Navajo Reservation made possible the doubling of the mine's output of this essential mineral. Likewise it has been possible to obtain additional logs from Indian-owned forests and saw mills by completing several roads. The development of asbestos mining has necessitated plans for a road covering a section of an Apache Reservation which only Indians have heretofore traversed.

With 50 vacancies among Indian Service physicians and 150 vacancies among the nurses, the Indian Health Service is hard put to keep its organization together, and only by working overtime and with assistance from other employees can the excellent record of our physicians and nurses in caring for the Indians' health be maintained. Despite these handicaps the record of achievement of the Indian Health Service continued to be impressive.

The death rate among the Indians has dropped 53.3 percent in the past 12 years, and they are continuing to gain in numbers slightly faster than the general population. Of some 430,000 Indians in the United States and Alaska, 401,384 are under Federal jurisdiction.

Additional hospitals, trained medical personnel, modern schools, and an improved economic status for the Indians have all contributed

to lowering the death rate among them. The Indian birth rate has fallen about 25 percent in the past 12 years, but this is more than compensated by the sharp reduction in Indian deaths.

"SULFA" TREATMENT FOR TRACHOMA

One of the most common and ancient diseases of mankind is trachoma, an eye affliction. The disease is contagious, intensely painful, blurs the vision, and often results in partial blindness and occasionally, total blindness. According to Indian Service physicians who have been treating Indians for this disease during the past half century, trachoma is caused by a virus. The Indian Service introduced sulfanilamide treatment in 1939, and the trachoma incidence among Indians dropped from 30 to 7 percent in the fiscal year 1942 and to 5 percent during the past year. The "sulfa" treatment is more economical from the point of view of time and effort and pain than any other treatment yet developed, and does not injure the eye tissues as have some of the harsh external treatments. Indian Service physicians have made a comprehensive survey of trachoma and of their experiences in administering the "sulfa" treatment. Their findings will be made available to the medical world in a paper to be published soon.

Several years ago an Indian Service physician was assigned to study the food habits of certain Southwest Indian communities. He had previously found serious nutrition deficiencies in the diet of western Shoshone children who, after being given the needed vitamins in their school lunches, immediately began to progress in school. This specialist has found the foods of Southwest Indian communities markedly deficient in certain nutritive values. The only products natural to the area containing the desired food values and easily accessible to the Indians are pine needles and, among the Papago, a certain cactus. To supply this need, employees are experimenting with bean sprouts, drawing on the Orientals' long experience in this field. In the Pueblos area, fish ponds were planted this past year to supply a source of food whose nutritive values are not represented in any other foods in the present diets of the Indians.

During the past year four Indian hospitals were closed, and the Tomah, Wis., Indian school and hospital were turned over to the War Department. Indians who would otherwise go to the hospitals at Leupp and Toadlena on the Navajo Reservation and to Towaoc on the Consolidated Ute jurisdiction will be cared for in other Indian Service hospitals. Local contracts have been made with private

physicians to care for Indians of the Sac and Fox jurisdiction in Iowa and in the Tomah area in Wisconsin.

The State sanatorium of North Dakota has set aside 50 beds for the use of the Indian Service in treating Indians who have tuberculosis. Thirty-one of the thirty-two Turtle Mountain Indians known to have active tuberculosis are now under treatment at the State sanatorium, a record which any community in the United States might well envy.

Adequate health and school facilities are still lacking in some remote Alaska communities, but Alaska natives generally have had better service the past year because of the presence of our military forces in the Territory. Army, Navy, Coast Guard, and Marine officials have cooperated in epidemics and emergencies, either by supplying medical treatment or by furnishing rapid transportation for the natives to medical centers.

LARGEST HOSPITAL COMPLETED

Because of war demands for building materials, few new buildings were constructed, but the Indian Service was fortunate in completing within the past year the largest hospital that it has ever built. The Tacoma hospital was started July 1941. Total cost of the principal building and the dozen buildings attached to it, including quarters for physicians and nurses, a laundry and commissary, was approximately \$1,300,000.

Commanding a view of Tacoma, Wash., and Mount Rainier on the east and the Olympic Mountains on the west, the hospital building is six stories from the basement to the auditorium, contains 350 beds and a fully-equipped out-patient department. It serves the Indians of the Northwest and Alaska. With the shortage of medical personnel, only 250 beds are now in use, but excellent doctors may be called in an emergency or for consultations from Tacoma.

The modern fireproof buildings finished in light buff brick with a limestone trim replace 56 obsolete frame buildings formerly used as an Indian school, and following the last World War as a veterans' facility.

In June 1942, the Japanese Army occupied certain islands in the Aleutians, bringing the war to the very doorsteps of the Alaska Indian Service. On Attu live 45 Aleuts and two Indian Service employees, Mr. and Mrs. Charles Foster Jones. According to a boat operator who visited the island of Attu several months prior to the Japanese invasion, Mr. Jones had planned with the natives the total destruction of their oil and gas stores, radio, and other equipment

which might be of value to the Japanese. Jones had also trained the natives as a small army and said they expected to resist if the Japanese landed.

The 63-year-old Jones couple were offered the Attu post in 1941 because of their long successful experience in Alaska and because they were versed in many skills and were extremely adaptable. Mrs. Jones was a qualified teacher, social worker, and trained nurse. Mr. Jones, who had spent his earlier years prospecting for gold in the Far North, was an experienced radio operator and could repair and maintain many types of machinery. The Weather Bureau needed a radio operator to report the weather on Attu, which has been described as the weather factory of the world. Until a few hours before the Japanese invasion, Jones reported weather schedules hourly to the Alaska Defense Command in addition to performing his duties as an Indian Service special assistant.

THE JONESES VS. TOJO

Early in the spring of 1941, the Joneses carefully considered the possible dangers on Attu and then accepted the new post with enthusiasm. Transferring from Old Harbor, Alaska, they arrived on Attu in August 1941. Mrs. Jones' letters to the Juneau headquarters praised the native village as clean, progressive, and intelligent. Mr. Jones wrote discussing plans for introducing reindeer on the island to supplement the natives' income from fishing and trapping. After Pearl Harbor Mr. and Mrs. Jones were asked to discuss with the natives the possibility of evacuation to the mainland until after the war. Their answer in the face of daily threats radioed from Tokyo was that they preferred to take their chances and defend their island home. By the time the authorities had decided that evacuation was a military necessity and shipping arrangements were completed, it was too late to reach Attu. The fate of the Aleuts and of the Joneses is still unknown to the Service.

The Aleut people living on the islands of Atka, Akutan, Kashega, Makushin, the Pribilofs, and Unalaska were safely removed to villages in southeastern Alaska before any persons were injured or captured by the Japanese. The 477 Pribilof Islanders who were moved to Funter Bay, the site of an abandoned fish cannery, are under the jurisdiction of the Fish and Wildlife Service. The remainder of the Aleuts received Indian Service assistance.

The hundred other native families were furnished the lumber and tools with which to build cottages for themselves at their "duration" homes on the Alaskan mainland. For people who come from a land

where no trees grow, the Aleuts performed well with hammers and nails. According to an Indian Service official who supervised their resettlement at Ward Lake, the Aleuts built many houses from foundation to roof in a single day—complete with electrical wiring, hardware, windows, doors, and three or four rooms. The total cost of each house was less than \$150.

The Aleut evacuees have had no difficulty in obtaining employment or in earning a livelihood from fishing and trapping since settling in their new homes.

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Indian courts and Indian justice continue to operate satisfactorily, especially in close-knit Indian communities and in those areas where Indians and non-Indians are not living side by side. By far the large majority of the Indians are law abiding. Indian police and Indian judges need additional training and advice, but the Indian Service's Law Enforcement Staff, regrettably, is not large enough to contribute more in the field of training.

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family or clan relationships with a head man to enforce tribal moral codes. In their migrations from one seasonal job to another, the Seminoles create no housing problem, preferring their open thatched palmetto chikis to any kind of house that white men have yet devised. A large sugar beet corporation which has been nationally praised because of the clean, attractive town provided for its workers was forced to provide, in a recent contract signed with Seminole workers, for the use of a truck for gathering palmettos. The Seminoles chose to build their traditional shelter rather than live in the company houses.

Large numbers of Indians have been employed in jobs and in areas where they had never been employed prior to the war. Some 300 Sioux Indians were employed during the growing and harvesting season in the Platte Valley in Colorado. Four to six hundred Navajos were located along the Arkansas River between the town of Pueblo, Colo., and the Kansas border. Three to four hundred Navajos work in mines at Morenci, Ariz. More than 300 Pimas and Papagos work in mines at Ajo, Ariz. Some 800 Navajos load shells at the Fort Win-gate Ordnance Depot in New Mexico. Several hundred Navajos are employed in the Sacramento Valley, Calif. Additional hundreds from dozens of different tribes are scattered through the West.

Representative Karl Mundt, of South Dakota, has placed before the House Committee on Indian Affairs a resolution to investigate the administration of Indian Affairs and to determine whether or not the Indians have received benefits under the Indian Reorganization Act. I record here some of the remarks I made at committee hearings on the Mundt resolution:

The Indian Reorganization Act fits the need of any Indian group whose members live and work in the same neighborhood or reservation. It fits those who have kept their ancient ways and those who have changed to modern ways. Its basic principle is that men need to organize, and that democratic organization protects and strengthens, and does not endanger or weaken, individual responsibility and rights.

However, the Indian Reorganization Act does not require Indians to organize. It is solely permissive. A tribe which has brought itself under the act is free to postpone organization indefinitely. Or it may organize politically (under a constitution) and never organize industrially (under a charter). The actual record to date is as follows:

192 tribes (130,704 Indians) accepted the act.

88 tribes (100,000 Indians) have adopted constitutions.

68 tribes (69,753 Indians) have received charters of incorporation.

In addition, the Indians of Oklahoma and the natives of Alaska were blanketed in by Congress.

POLITICAL AND ECONOMIC ORGANIZATION

It goes without saying that Indian political and industrial management under the Indian Reorganization Act has not been perfect. Human affairs are not ever perfect. Majorities sometimes are unwise, sometimes are tyrannical. Legislative and executive representatives and officers sometimes are incompetent, or partisan, or corrupt. This is human life and it is Indian life. We believe that an examination of Indian organized life under the Indian Reorganization Act (and also, outside the Indian Reorganization Act) will show that it compares very well indeed with white organized life. Indian organization has produced a very impressive release of energy, and increase of purposeful effort and of economic production, among the tribes. It has, too, furnished a greatly needed outlet for exiled and suppressed emotion among the tribes; and if in some places it has brought into being debate, political excitement and even political uproar among some Indians, that, it would seem is to the good. Certainly it is our traditional and valued American way. To give body and form to this summary concerning the Indian Reorganization Act, I supply briefly a single example. It is taken from an article which I wrote for the *Atlantic Monthly*, September 1942.

"The several Apache bands were crushed in war and were then held for two generations in idleness. They were governed by authority immovable though not unkind. The Mescalero Apaches in southern New Mexico live amid 400,000 upland and high mountain acres. Nine years ago their land was used by white lessees. Six out of seven in the tribe inhabited a camp slum clustered about the Indian agency. The Government in preceding years from time to time had endeavored to lure or force the Mescaleros out from their noisome camp and back onto the land. In vain; authority failed, and inducement, and argument to the individual failed. Death doomed, robbed of their war-way, the Mescaleros had regressed, and they silently immured themselves in their despondency.

"To Santo Domingo Pueblo in 1934 the Mescaleros' delegates came. The draft of the Indian reorganization bill was being presented, and the Pueblos said 'Indeed and of course, for this is our own old-time day.' Incredulous, the Mescaleros went home.

"Congress passed the Reorganization Act. The Mescaleros were informed: It is the law. The law says that you must yourselves decide, for yourselves, whether you want to be free. You are required to make this choice, and it may be forever.

"They chose freedom, and then they realized that it was they themselves who must plan their future life. Tribes under the Reorganization Act may formulate political constitutions which thereafter only they or Congress can change, and they may adopt corporate charters empowering them for the whole range of business enterprise. The Mescaleros framed a constitution and charter, and earth and life began to emerge under a clear light, a light new and yet known from long ago. A miasma of collective regression started to fade away.

"Utilizing a government loan—there have been no delinquencies in repayment—the Mescaleros abandoned their slum camp and resettled themselves out where farming and cattle-running could supplement each other. Their net income from cattle jumped from \$18,000 to \$101,000 in 3 years. They closed out all leases to whites and they now use their entire range and built up its herbage and soil while using it. Their farm crops multiplied eightfold in value in 3 years. These figures are indices merely. Long-range economic planning has become a matter of course with the Mescaleros. Their energies surge. They have their war-way once more, their chance for combat, for leadership, the endless universal war-way wherein nature is antagonist and collaborator in one. Among the Mescaleros

as among all the other tribes that have organized under the new policy, women and men have equal duties and privileges."

ADJUSTMENT TO WAR CONDITIONS SOUGHT

The in-service summer school was not held in 1942, but the replacement of many former employees with persons unfamiliar with Indian Service necessitated a session this year. Two hundred and eighty employees attended the summer school which was held during the month of June 1943 at Haskell Institute, Lawrence, Kans. The courses were designed to help teachers adjust to wartime conditions. One of the most popular classes attended by 75 women offered actual experience in repairing and maintaining mechanical equipment, refrigerators, locks, stoves, plumbing and laundry facilities, such as are attached to Indian Service schools in areas in which there is no mechanical assistance for many teachers.

The Indian Service supervisor in the management and marketing of Indian-owned livestock instructed employees in stock-raising, animal feeding, sanitation, and the construction of shelter for livestock and poultry. In order to increase local meat supplies, some employees received instruction in the care of rabbits and the building of rabbit hutches from second-hand materials which are easily available. Teachers and school principals from the Southwest were especially interested in classes in chemical gardening and in the sprouting of beans, and grew crops while they were at Haskell.

In a 25- by 50-foot greenhouse at the United Pueblos Agency, Albuquerque, N. Mex., one Indian Service employee is already growing vegetables with chemicals in his spare time for consumption in the schools and hospitals under that jurisdiction. Lettuce is ready for the table 29 days after planting the seed. A small section of the greenhouse yields 65 pounds of green vegetables each week.

Indians have dried meats, vegetables, and berries by simple methods for ages, but only within the last few years has the Indian Service begun experimentation in modern dehydration. A number of Indian Service schools have installed dehydration plants. The Indian Service boarding school at Phoenix, Ariz., has pioneered in this field with the cooperation of the Department of Agriculture. During the past year, Phoenix Indian School furnished a year's supply of dehydrated fruits and vegetables to the Eklutna, White Mountain, and Wrangell Boarding Schools and six Indian Service hospitals, all located in Alaska, and in addition preserved many types of food for its own use. The commandeering of transportation facilities to meet military needs greatly increases the desirability of dehydrated foods both for civilian

and military consumption because of the smaller shipping space required for foods that have been dried. Also, dried foods do not spoil. Oranges, grapefruit, onions, beets, potatoes, carrots, corn, beans, cabbage, and spinach are among the foods that are being dehydrated successfully. All but 4 percent of the moisture is usually extracted in the process.

"EARTH BRICK CONSTRUCTION" PUBLISHED

Indian Service educators issued a revised book list of recommended reading for schools and also compiled an extensive bibliography of materials for schools in wartime. The long-awaited publication entitled "Earth Brick Construction" by Elbert Hubbell, specialist in building with native materials, appeared this year. The booklet contains instructions, plans, and illustrations for building with adobe and asphalt stabilized earth bricks, an economical type of construction which is growing in popularity in many parts of the West.

The fourth booklet in the Indian handicraft series, *Crafts of the Ojibwa*, by Carrie A. Lyford, appeared this year. Also published were additional school readers written by Ann Nolan Clark and illustrated by Indian artists, including four in the Sioux-English bilingual series, *The Pine Ridge Porcupine*, *The Slim Butte Raccoon*, *The Grass Mountain Mouse*, and *There Still Are Buffalo*, and Mrs. Clark's first reader in the Spanish-English series, *Young Hunter of Picuris*. These booklets are printed by Indian student printers in Indian school print shops, and as many of the youths have gone to war, Indian girls are assisting in the shops at Haskell and at Sherman Institute, Riverside, Calif. The pamphlets may be purchased at 50 cents each from Haskell Institute, Lawrence, Kans.

Publications emanating from the University of Chicago's study to determine the extent to which Indian native autonomy in the United States has been affected by the many years of Federal rule will begin to appear in the fall of 1943. Indian Service physicians and teachers worked many extra hours during the past year to assemble the necessary information, administer scientific tests and make physical examinations of 1,000 selected children between 6 and 18 years of age. These children live in 11 communities on the Hopi, Navajo, Pueblo, Papago, and Pine Ridge jurisdictions.

Few governmental agencies have undertaken so exhaustive an analysis and criticism of their work and its results. Already for those Federal employees engaged in the fact-finding, the research has provided valuable in-serving training. The study is under the direc-

tion of Dr. W. Lloyd Warner, professor of anthropology and sociology, and Dr. Laura Thompson, coordinator of research.

Designed to provide the basis for sounder education and adjustment of aboriginal peoples whose cultures now in transition are overshadowed by industrial civilization, the study of factors molding Indian personality may indirectly benefit the 30,000,000 Indians in the Americas. It has international sponsorship by the Inter-American Indian Institute, and a similar study is being undertaken in Mexico.

LATIN-AMERICANS VISIT U. S. RESERVATIONS

The National Indian Institute, having sent representatives to Latin-American countries during the past 2 years to acquire some understanding of their vast Indian problems, was able this year to offer practical training to a group of 11 distinguished Latin-American technicians and rural educators who visited U. S. Indian Reservations. The Research Fellows came from the countries of Bolivia, Ecuador, Peru, Guatemala, Mexico, Panama, Haiti, and El Salvador. Sharing their time with other Federal agencies, the Latin-Americans spent from 3 weeks to 4 months studying U. S. Indian administration. Several representatives visited the Sioux country in the Dakotas, but they concentrated their studies on southwest reservations because climate, soil, and other factors there more closely approximate those which are found among their own rural Indians. Also our largest Spanish-American population lives in the Southwest.

The Research Fellows also learned something of the administrative mechanics of the Indian Service in its headquarters. They interviewed officials in Chicago and Washington and visited the summer school for Indian Service employees at Haskell Institute.

This preliminary Latin-American in-service training furnished such rich experiences to the Research Fellows and to the Indian Service that we hope an exchange of experiences between the United States and those countries having aboriginal peoples may continue. The Indian Service is in a position to offer more intensive training over a longer period, actually encouraging representatives of other countries to understudy those Indian Service positions here which correspond with theirs at home and to meet and solve problems as they arise.

PERSONNEL CHANGES, LOSSES, NUMEROUS

Like many other agencies, the Indian Service has experienced the most rapid changes and losses among its own personnel in its history.

Eight hundred and thirty-eight regular employees have left for military service; others have transferred to agencies more directly responsible for the war program.

There are probably few employees throughout the Indian Service who are not performing more duties than their job-sheets describe in order to meet the war emergency. Teachers have been asked to guard the forests in lieu of fire look-outs. They have been asked to perform clerical work in the agency and hospital offices. In many instances, one employee is performing the work that two employees performed prior to the war, and in some instances, one employee has replaced three.

This has been made possible by the introduction of improved systems of statistical reporting and in-service training. A new machine tabulation system now being introduced in Indian Service hospitals is expected to reduce clerical work performed by the nurses and physicians 20 to 25 percent.

The recent law requiring payment of time and a half for official time worked beyond 40 hours a week has raised employee-morale considerably. I am aware that employees often work many hours beyond 48 hours a week because of seasonal and other exigencies. School and agency headquarters are often the only places from which an Indian can telephone, obtain a doctor's services, or whatever else may be needed in an emergency. Indian Service employees in the field cannot adhere to a daily or weekly time schedule, nor would a rigid schedule be desirable in administering to human needs in rural areas.

The wartime shortage of personnel and the fact that the bulk of the headquarters staff is now located 800 miles from Washington are bringing about a few long-needed changes in procedures. Additional authority has been delegated to Bureau heads, and the consequent simplifying of procedures is resulting in the saving of time and the elimination of needless correspondence. For example, certain legal problems of the Indians may now be referred directly to the field offices of United States attorneys. Thus, in April and May 1942 the legal staff received 589 communications from the Department of Justice as compared with only 195 such communications in the same months of this year, a decline considerably in excess of 50 percent.

Other changes are taking place throughout the headquarters and the field staffs. The small library and information staffs have been consolidated in order to effect economies in the answering of inquiries. The news magazine, *Indians at Work*, in which many inquiries of a general nature are answered, was formerly published monthly but now appears every other month. Among the magazine's readers are Indian

soldiers in New Guinea, Africa, England, and Alaska. They have written letters to thank the Bureau for the magazine.

The war has not curtailed the number of Indian estates to be probated, but the probate staff is reduced from four attorneys and two clerk-stenographers prior to August 1942 to the present chief probate attorney, one attorney, and one clerk-stenographer. There remain eight examiners of inheritance in the field offices. During the fiscal year, 1,403 cases were received by the probate staff, and despite the greatly reduced personnel, the work is as current as usual, only 50 cases awaiting attention. Probate matters involving the Five Civilized Tribes and the Osage Nation are handled separately. Through the efforts of the Indian Service, Indians of the Five Civilized Tribes were saved \$163,876.70 in the disposition of 995 cases in the county courts, and 143 cases in Federal, State supreme, and district courts. For the Osage Nation, 141 cases were disposed of in the Federal, State supreme, and district courts while 216 Osage cases are pending. Many Osage estates are very valuable and cases often remain in the courts for years.

MISSION TO ARABIA

At the request of King Ibn Saud, who is attempting to acquire modern equipment and methods to improve the economic lot of his people, the chief engineer of the Indian Service, A. L. Wathen, J. G. Hamilton, of the Department of Agriculture, who formerly worked on soil conservation on the Navajo Reservation, and K. S. Twitchell, who has spent many years in Arabia, comprised the first U. S. Agricultural Mission to Saudi, Arabia. Mr. Twitchell had recommended to the State department, which sponsored the mission, that persons having technical experience in enhancing the economic opportunities of the Indians of this country be members of the mission. The mission traveled more than 11,000 miles in Arabia by automobile, donkey and camel, and visited places not previously seen by white persons. Every courtesy was extended to the Americans during their 10 months' stay by the King and the friendly Arabs. In the Hedjas mountains along the Red Sea, they found terraces that had been constructed probably thousands of years ago and are still maintained in good condition by the Arabs. They also found that, contrary to popular opinion, drainage is a principal requirement for the increase of crop production, particularly along the Persian Gulf, because of numerous springs that flow uncontrolled. Their findings and recommendations were published by the State department this year in English and in Arabic for the use of King Ibn Saud and his advisers.

SERVICE ADMINISTERS RELOCATION PROJECT

We continued through the year to administer the War Relocation project on the Colorado River Indian Reservation in Arizona. As reported last year, this center was built by the War Department to house 20,000 Japanese and persons of Japanese descent who had been evacuated from the West Coast. The project is composed of three separate camps which are located south of Parker, Ariz., and below that portion of the reservation occupied by the Colorado River tribe. Altogether, 10 of these centers were developed for the War Relocation Authority and while only the center on the Colorado River reservation is operated by the Indian Service, two others, the Gila River center and the Leupp Detention Camp, occupy Indian lands.

Throughout the year our attention was mainly occupied with the construction phases of this project. The digging of irrigation canals and laterals and drains, the subjugation of land, the building of a trunk highway into the town of Parker, with secondary roads and streets within the three camps, and the building of schools and quarters for administrative personnel consumed the greater part of the funds and manpower which were available to the project. The housing provided by the Army engineers consists of simple barracks of the theater of operations type, covered with tar paper, which afford little protection from the extreme summer heat or from dust, which hangs in clouds over the camp much of the time. Little could be done to modify the basic housing, but in the construction of schools adobe brick has been used. This has the advantage of being economical and of providing insulation against extremes of temperature.

As the construction period draws to a close, and it is anticipated that most of the public works will have been put in operation by this fall, emphasis will shift to food raising. For the time being it is planned to cultivate about 5,000 acres, most of which will be planted to vegetables, with some feed for livestock. Already, hogs and poultry are being raised in sufficient quantity to meet the needs of the evacuees. The center is now almost self-sustaining in certain basic foods, requiring only the purchase on the outside of dairy products and beef. During the quarter ending June 30, 1943, a total of 540,000 pounds of vegetables was produced. No industrial activity is contemplated except for minor production of processed foods and clothing, with some woodcraft and carving, artificial flowers and minor art work.

COUNCILS FUNCTION IN EACH CAMP

Particular effort has been devoted to organizing the evacuees as a community. A temporary governing council was first elected in each

of the three camps and while the camp population gained familiarity with its problems and opportunities, discussion went forward in the formulation of a municipal charter. Such a charter was recently adopted by popular vote and permanent councils now function in each camp. There is also a general council composed of representatives of the camps.

While the center provides food, shelter, health care, and education, all basic needs, it cannot provide for the many personal requirements of the evacuees. Laundry and dry-cleaning, shoe repairs, barbering and manicuring, and miscellaneous household goods and staples must be paid for out of cash wages (wage scales of \$12, \$16, and \$19 per month are in force) or out of savings which the evacuees brought with them. Canteens were established as soon as the center was opened and in time these canteens were handling a volume of business amounting to several thousand dollars daily. This enterprise is now organized on a cooperative basis. As in the case of the development of community government, this step was taken after months of educational work and after it had been submitted to popular vote.

The project has maintained from the beginning a social analysis section, the purpose of which was to keep a day-to-day objective record of community events, administrative decisions, and evacuee sentiments. The materials of such a record then furnish points of reference for the analysis of community opinion at any time or for prediction as to what this opinion may be at some future time, in given circumstances. It is an attempt to develop a technique by which an administrative agency dealing with people can gauge its effectiveness in directing the efforts or meeting the needs of such people.

A POST-WAR PROBLEM

The great exodus of Indians from their homes confronts the Indian Service with a number of post-war problems.

Should economic conditions after the war continue to offer employment opportunities in industry, many Indians will undoubtedly choose to continue to work away from the reservations. Never before have they been so well prepared to take their places among the general citizenry and to become assimilated into the white population. Between 1934 and 1942, an extensive program of adult education was carried on throughout the reservations. Many, as CCC enrollees, learned to operate jackhammers, to weld, to drive bulldozers, and to maintain and repair all kinds of equipment. Under the Public Works program, large numbers of Indians were employed in the construction of schools and hospitals on reservations. In the road-building program of the

past ten years hundreds of Indians became proficient in the operation of heavy machinery, in surveying, and other skills involved in road construction and maintenance.

In addition, the vocational schools were much more proficient and each year several hundred young people were graduated directly from schools into skilled jobs. Since 1930 the Indian Service has devoted much effort to rehabilitation of the reservation resources, but this very program was the best possible training Indians could have received for off-reservation living. It will be no surprise, therefore, if a sizable proportion of those Indians now away from home continue in urban industrial employment during the post-war period.

PLANNING POST-WAR PROJECTS

If, on the other hand, the war is followed by a period of depression and unemployment, the majority of those who are now away from their homes will return to the reservations. To enable these thousands of returning soldiers and workers to find work opportunities, I have asked Indian Service technicians to assist the Tribal Councils to intensify their plans for the fullest use of reservation resources, and to supplement these by plans of a public works character. According to a preliminary estimate several million dollars worth of improvements in the rehabilitation of the soil and forests, the adjustment of a complicated land ownership problem, the construction and improvement of many miles of roads, and the building or reconditioning of scores of schools and hospitals are urgently needed on Indian reservations. Indian Service architects and engineers are now preparing plans and making estimates of probable costs, and of the number of Indians who can be absorbed by such work.

The Federal Works Agency and the U. S. Army Engineers requested the Indian Service to make plans for a town site located at the terminus of the Alaska Highway. The plans were furnished to these agencies during the past year, but because of the shortage of shipping facilities, construction of the town will not get under way for some time.

Many Indians returning home will want to take up where they left off in livestock farming, lumbering, fishing, and other reservation enterprises.

Whether Indians of the post-war era remain at home or find their way into the outside world they are going to be much more critical of conditions both local and national. The old ties of home and tribe, the ancient ways of dealing with problems of sickness, of marriage, of relations of youth to elders, these and many others will undergo change

as the youth receive new ideas from the far corners of the world. Promises made over many years: rights as citizens, self-government, political equality, economic rehabilitation, will take on increased meaning. Young people coming back from service in the armed forces are going to demand that the American people make good on these promises. They will no longer tolerate the discrimination of special liquor laws which make it a Federal offense to sell liquor to an Indian. Many Indians in uniform have been turned away from bars where other soldiers, white, Negro, Japanese, Philippine, were being served.

On behalf of the Navajo boys at an Army camp, a Navajo soldier recently wrote his superintendent, "We do not understand the kind of citizenship that says we can fight but not vote." In 1924 the Congress declared all Indians to be citizens, but several States with large Indian populations still disfranchise the Indians.

HOW THE SERVICE SERVES

In this report I have sought to describe the work of the Indian Service very largely by reporting the accomplishments, the needs, and the desires of the Indians themselves. It is the function of the Service to give guidance and assistance to the Indians where they need it. In many Indian communities, Indian Service employees serve on Selective Service boards. They implement OPA rationing machinery in Indian country. They advise the Indians on the filing of income tax returns, on the purchase of War Bonds and on their many other responsibilities to a nation at war which demands the united participation of all its people, including its non-English speaking Indian and Eskimo citizens living thousands of miles from our great population centers. Service employees have suggested to the Indians that they brush up on English before enlisting or that they find someone to carry on their farming enterprises before leaving home. Our task is to try to answer their questions, to interpret for them new forms and regulations which apply to many of them for the first time.

These new conditions facing the Indians have demanded a continual recasting of the functions of the Indian Service. With acute shortages of manpower, it has been necessary to simplify procedures, to assign new and different tasks to personnel, and to eliminate all activities except those directly connected with the war or essential to the welfare of the Indians. This recasting of functions will continue so long as the Nation demands increased production of minerals, timber, and food to achieve a victorious peace.

Board on Geographical Names

MEREDITH F. BURRILL, Director

THIS Board, established in 1890, is the official authority on the use of geographic names by the Federal Government and is the agency charged with bringing about uniform usage of geographic nomenclature and orthography. The Board decides all disputed questions concerning geographic names; determines, changes and fixes place names within the United States and its Territories and possessions; maintains central files of information on geographic names; prepares gazetteers and standardizes procedures for preparation of gazetteers by other agencies and establishes rules for guidance and standard procedures for naming hitherto unnamed places and for transliterating geographic names from languages that do not use the Latin alphabet. The Board also serves as an informal authority in non-Government use of place names and gives information on these names, their pronunciation and their locations from its extensive files. Pronunciation of place names has assumed an importance which it has never had before, by reason of the combination of radio broadcasting and the interest in war names all over the world. Governmental agencies, the press, and radio are being assisted in their use of geographical names as an important step in bringing about uniform usage. The Board also maintains contact with comparable agencies in foreign countries looking toward the development of uniform geographic nomenclatures and orthographies.

During the latter part of the fiscal year, the Board has been enlarged and reorganized primarily to perform functions required in connection with the operations of the armed forces. The enormous increase in map production by the armed forces not only calls for a correspondingly large number of name decisions, but requires that they be made promptly. Use of varying names for a place or feature on military maps not only complicates the geographical name prob-

lems by wide circulation of improper names, but also creates confusion in field operations, the accurate transmission of messages and the transportation of materials and men.

Many geographical names in foreign countries have quite different forms when transliterated or translated and may have more than a single form in the language of the country. These foreign name problems are being dealt with in a wholesale manner by the promulgation of standard rules and procedures for treating names in specific foreign countries or regions and by the preparation of gazetteers, place name indexes and special lists of alternate names and geographical positions. Simultaneously, decisions are being rendered on the most pressing questions involving individual geographic names. These actions have made possible the uniform usage of names on a large number of maps and charts made by several agencies for use by the armed forces.

Procedures have been improved by division of labor and specialization of personnel to make decisions at the rate of hundreds per week; to answer a constant flow of inquiries concerning these and other geographical names, and to assemble and maintain the necessary files and records. Staffing of the reorganized Board, which will have a total personnel of 135, including approximately 45 professional geographers—most of whom will be regional specialists devoting themselves to a particular part of the world—was still in progress at the end of the fiscal year. Since there was no precedent for many of the specialized positions, intensive training programs have been devised to train the nonprofessional personnel for this work. A remarkable increase in production has been achieved in a brief period. The Board's library now includes more than 2,500 bound volumes, 1,000 pamphlets, 55,000 separate maps and a large number of atlases.

During the fiscal year prior to the reorganization of the Board, 284 decisions were rendered by the executive committee at 11 meetings. A cumulative report is being prepared which will include these and all previous name decisions, totaling some 24,000.

Division of Personnel Supervision and Management

MRS. J. ATWOOD MAULDING, Director

MANPOWER and its utilization has been the major problem of the Division during this fiscal year as it has been in the whole Nation, and our efforts have been largely directed toward its solution with relation to the Department's needs. In the early fall of 1942 the Secretary of the Interior called upon the bureaus and offices of the department to canvass their personnel situations and to determine whether (1) any activities not essential to the war program could be discontinued or postponed; (2) any time-consuming procedures and record keeping could be eliminated during the war program; (3) any rearrangements of work might be made which would release employees or make the filling of existing vacancies unnecessary; (4) any employees not being used at their highest skills or to their fullest capacities could be assigned more effectively within the bureau; and (5) whether training programs could be inaugurated to meet specialized needs. The bureaus diligently went about putting their houses in order.

The Division has given more than usual attention to the fullest utilization of the Department's own personnel to avoid drawing on the outside manpower pool, and its inventory of employee qualifications has aided not only in recruitment but has provided better individual placement. Some idea of the success of the Division's efforts is indicated by the fact that during the calendar year 1942, 71 percent of the vacancies above the entrance grades in the District of Columbia were filled from within the Department. This process, of course, was far from sufficient to meet the greater needs of our war program which demanded specialized experience. A particularly difficult situation has been the recruitment of engineering aids for the Geological Survey's strategic mapping program. All known sources of recruitment have been tapped; at the request of the Department and the Civil Service Commission, qualifying courses have been introduced

in a number of universities and colleges, and the Department has even appealed to the families of its own employees to provide trainees.

In the recruitment process the policy has been to secure as many women, older men and physically handicapped persons as might be found qualified. It is significant that at the end of this fiscal year the Department has 1,500 more women on its rolls than it had when Pearl Harbor was attacked. Many older physicians in the Indian Service communities have been employed to meet the shortage, and many other older men and physically handicapped persons have demonstrated their ability to carry on for our men who have entered the military service, of whom there were approximately 5,000 at the close of the fiscal year.

On March 12, 1943, the Secretary designated a Committee on Deferral of Government Employees for the Department to carry out the provisions of Executive Order No. 9309 of March 6, 1943. The committee is composed of the Assistant Secretary as chairman, the Director of the Bureau of Mines and the Director of Personnel. Because of the specialized war work which is being done in the Department, and which requires professional and technical employees, and because of the scarcity of replacements in these fields, a considerable number of draft deferment requests have come before the committee.

The unusual scarcity of qualified stenographers compelled the Division to carry on throughout the year a training session for the orientation of new appointees and for bringing those of substandard qualifications to a productive level. Other training projects were carried on, an outstanding one being a course in departmental administration involving the general subjects of administration, fiscal accounting, personnel, office and property management and public relations.

During the year classification procedures were studied, simplified, and accelerated. The classification office acted upon 21,530 cases. Effective February 1, 1943, regulations were issued providing for the application of a 25-percent differential to salary classification rates outside of continental United States.

During the year over 60,000 personnel actions were processed. This number is higher than in previous years, partly due to a higher rate of turn-over which averaged 31.9 percent in Washington and 55.4 percent in the field.

Certain acts of Congress which became effective during the fiscal year had an important bearing on the work of this Division. Public Law 821, approved December 22, 1942, and Public Law 49, approved May 7, 1943, provided for overtime pay and compensation. Public Law 806, approved December 17, 1942, provided for an accumulation

of annual leave up to 90 days. The Revenue Act of 1942 provided for a Victory Tax deduction; and later in the fiscal year the Current Tax Payment Act of 1943 required a withholding tax from the salaries of employees.

The transfer of the Indian Office, National Park Service and Fish and Wildlife Service to Chicago early in the fiscal year required some adjustment in processing procedures. Pay roll and leave work formerly handled in the Division was also decentralized to the bureaus. During the fiscal year there were 27 retirements for age, 77 optional retirements and 38 for disability. Fifteen employees were reemployed after reaching retirement age.

The number of grievance cases and disciplinary actions in the Department during the year was small and my observation is that the morale of employees throughout is high. The staff of the Division while working under trying conditions has cooperated to the fullest extent in carrying out the responsibilities placed on them.

Office of the Solicitor

WARNER W. GARDNER, Solicitor¹

THE chief task of the Solicitor's Office during the past year has been the development of streamlined processes designated to channel the resources of the Nation into use in the war program. Impediments to the mobilization of war resources, created by a national coal strike, shortages of oil, power, and transportation, and a variety of obsolete laws and cumbersome administrative practices, were dealt with, and very largely overcome. To make possible swift action on matters of first importance the legal machinery of the entire Department had to be streamlined and the accumulations of old cases that impeded prompt legal action had to be liquidated. That efforts in this direction were reasonably successful is indicated by the fact that the work of the Solicitor's Office was substantially on a current basis at the close of the fiscal year.

While the chief efforts of the Department's lawyers were directed toward clearing the channels of national war production, constant vigilance was maintained against inroads upon the permanent interests of the Nation in the conservation of its natural resources and in the preservation of the civil rights of its citizenry. A difficult coal strike situation was so handled that the Department has cast no discernible shadow upon any of the rights of the 3,000 coal operators and half-million miners involved. The civil rights of the citizens of Hawaii and Puerto Rico were vigorously protected and amplified, despite the close impact of the war upon these island territories. In Hawaii the Department was successful in securing a substantial restoration of civil authority, which had been temporarily surrendered to the military on the day of Pearl Harbor. In the case of Puerto Rico the Solicitor's Office devoted much energy to the mapping of

¹ Nathan R. Margold resigned office on July 9, 1942, and Felix S. Cohen served as Acting Solicitor until August 26, when Mr. Gardner took office.

appropriate legislative measures for the strengthening of Puerto Rican self-government. The natives of Alaska found respect accorded to land rights which had long been violated or ignored; exclusive possession of six areas was assured to Indian and Eskimo groups in the first application of the act of May 1, 1936 (49 Stat. 1250); the War Department officially agreed to recognize the aboriginal rights of Alaskan natives in the large areas taken over for military purposes and the Department reaffirmed its recognition of aboriginal fishing rights in Alaskan coastal waters.

Seeking to combine efficient utilization of natural resources with a scrupulous regard for human rights and long-range national interests, the lawyers of the Department have had to meet new problems and new demands with prompt and resourceful counsel. If at the end of the year the Department can look back and see the accomplishments of the operating bureaus which fill the preceding pages of this volume, rather than a series of unsurmounted legal problems, then the attorneys of the Department can feel that they have done their job.

In the effort to streamline the legal work of the Department an extensive reorganization plan was mapped out and initial steps were taken toward its effectuation. The purpose was to centralize the professional supervision of legal service, while providing for more nearly complete legal service within the several bureaus, and for greater decentralization in administrative and fiscal matters on the Bureau level. The legal personnel work of the Department was coordinated under the direction of the Solicitor, and steps were taken to centralize in the Office of the Solicitor all legal work involving litigation, property acquisition, patent law, fiscal matters and personnel law. At the same time, the assignment of attorneys formerly carried on the Solicitor's pay roll to the pay rolls of the various Bureaus and Divisions of the Department made possible a substantial reduction in the budget of the Solicitor's Office.

LEGISLATION

Adjustment of the machinery of government to war needs was a primary objective in the departmental legislative program of the past year. Although substantially limiting its drafting efforts to legislation of importance to the prosecution of the war, the Legislative Division participated in drafting some 61 statutes which were enacted by the seventy-seventh and seventy-eighth Congresses during the past fiscal year. Another 40 or so statutes affecting the Department were enacted after the submission of reports prepared or reviewed by

this Division. Perhaps the most important of the statutes affecting the work of the Interior Department enacted during the past year is the Columbia Basin Project Act of March 10, 1943 (Pub. Law 8, 78th Cong.), providing for nonspeculative settlement of a vast agricultural area in family-size farming units, as a part of the Columbia Basin project.

MINES

The expansion of Bureau of Mines activities, under the impact of pressing war needs, carried with it a growing burden of legal work for the Mines Division of the Solicitor's Office. Urgent military requirements for helium required the making of contracts for the enlargement and construction of processing plants, as well as a series of additional contracts with owners of oil and gas wells, manufacturers of equipment, and other interested parties. Other contracts for the erection of pilot plants and related facilities for metallurgical investigation, special contracts covering exploratory drilling for strategic minerals, and cooperative agreements between the Government and various schools, universities, and other research institutions, added to the drafting work of the Mines Division.

The work of the Division under the Federal Explosives Act of December 26, 1941 (55 Stat. 863), shifted in emphasis during the past year from the initial development of a system of control to the actual enforcement of the act and the regulations. During the year more than 80 violations were reported to the Department of Justice and a number of convictions were secured. Forty proceedings were instituted for the revocation of licenses, and of those concluded, 20 terminated in license revocation. In no case has the holder of the revoked license appealed from the decision. Considerable effort has been directed toward securing the cooperation of State officials in the enforcement program. This has involved analysis of State laws, extensive correspondence and negotiation with State officials, and the preparation of model State legislation, adopted by the Council of State Governments as part of its program of State war legislation proposed to the State legislatures convening during the year.

Among other principal activities, the work of the Mines Division in connection with the general revision of bituminous coal prices culminating in the Secretary's minimum price order of September 30, 1942, and the preparation of Secretarial Order No. 1763, defining the rights of the Government in inventions by employees, together with the subsequent administration of that order, deserve particular mention.

PROPERTY ACQUISITION

The work of the Property Acquisition Division has in large measure been turned into wartime channels. It has handled the legal work involved in the acquisition of three helium plant sites, together with pipe line rights-of-way and gas reserves for the future, and plant sites for sponge iron development work. It has stationed two attorneys in the field to conduct the title work in connection with the war mineral exploration program. The title work formerly done in the General Land Office has been transferred to this Division, with apparent savings in manpower and time. Including also the land acquisitions of the National Park Service and of Indians and Indian tribes, there have been about 2,200 matters disposed of during the fiscal year. At the years' end, no piece of work had been in the Division for as long as a month.

PUBLIC LANDS

The Public Lands Division has continued to implement the conservation policy of Congress and of the Department with respect to the public lands and natural resources. It prepared a number of departmental decisions upholding the interest of the public in mineral deposits. One of these revoked an order which had the effect of limiting potash permits to a very few persons; another held that sodium borate lands are disposable by lease without loss of title to the Government, and a third held that certain extensive railroad grants are limited to rights-of-way for railroad purposes without impairing the right of the United States to the underlying minerals. The Division has handled three cases in the District Court of the District of Columbia; it was successful in all of them. The Division has prepared new Department-wide regulations on practitioners which, after issuance by the Secretary, replaced the archaic rules which have been in force for many years. It has contributed to the speedier conduct of Department affairs by establishing the legality of extensive delegation of powers by the Secretary to six of the Department's bureaus. While the flow of work has continued at substantially the same volume, about 6,100 items a year, the number of pending matters at the close of the fiscal year, 160, is at a record low.

The General Land Office continued its large-scale cooperation with the War and Navy Departments and by the end of the fiscal year had made available a total of more than 15 million acres of land for military purposes; in addition, lands and mineral deposits were withdrawn for the use of the war subsidiaries of the Reconstruction Finance Corporation. Included within the total of more than 35,000 items

relating to the administration of the public lands, the legal staff participated in drafting legislation and orders which would stimulate development of needed mineral resources.

The legal work in the Geological Survey has related in the large to the oil and gas leases on the public domain, including the approval of plans for the unitized development and operation of oil and gas areas. In the latter connection a procedure was developed through which the proposed general regulations for unit plans were published with an invitation to interested persons to file criticisms and suggestions, as a result of which hearings will be held to insure the fairest possible regulations.

The legal staff of the National Park Service has been reduced by about one-half, consistent with the diminished operations of the Park Service, with the result that a somewhat heavier individual burden has been handled by the remaining part of the staff. Slightly less than 200,000 acres of land were added to the Park Service areas during the fiscal year. Perhaps the major part of the legal issues has related to the problems raised by the contracted staff and program of the Park Service and the ways in which the areas may be administered and protected pending their full post-war use. The work of the legal staff, as of the Service in general, has been carried on under the additional handicap of the transfer of headquarters from Washington to Chicago.

CONSERVATION

The Conservation Division, in addition to its customary duties, has taken on new work in the course of the year. It has assumed the review of the work relating to the Office of the Coordinator of Fisheries, and the questions of personnel and fiscal law have been centralized in this Division. With the establishment of a formalized responsibility for these questions, they have grown considerably in number and it is to be supposed that the Department has received corresponding advantage from expert counsel on these questions.

The legal work of the Division of Territories has been shaped by the extraordinary impact of the war upon our Territories and island possessions. An example is the organization of central control of imports into Puerto Rico and the suspension of the coastwise shipping laws for Puerto Rico in order to help meet the threat of mass starvation which submarine sinkings and shipping shortages brought to Puerto Rico in the summer of 1942.

The legal work of the Fish and Wildlife Service has adapted itself, although handicapped because of removal of the headquarters of that Service to Chicago, to the war needs, requiring a diminution in the

wildlife refuge program and a corresponding increase in the functions relating to commercial fisheries. Executive Order No. 9204 of July 21, 1942, established the Office of Fishery Coordination, and Food Directive No. 2 of the Secretary of Agriculture delegated to the Secretary of the Interior the food production powers conferred upon the Secretary of Agriculture by Executive Order No. 9280 of December 5, 1942, so far as these powers related to the production of fish. Under the authority of this order, regulations were prepared which served to concentrate and to utilize more effectively the equipment of the Alaskan salmon industry and the pilchard industry on the west coast.

The services of the Legal Division of the Bureau of Reclamation were largely directed during the past year to the preparation of contracts for the construction of dams and reservoirs and for the disposition of power and irrigation water developed thereby. Although War Production Board orders late in 1942 suspended construction on a number of Bureau projects, incidentally giving rise to many novel legal contract problems, the negotiation of long-range programs of water control proceeded at an accelerated pace. Interstate compacts relating to the Republican, Belle Fourche, Yellowstone, and Missouri Rivers, the Columbia Basin project, and the Central Valley project demanded a considerable part of the energies of the legal division of the Bureau, together with many other smaller projects. In the field of litigation the Bureau conducted or participated in a number of cases, including cases dealing with: (a) the scope of the Secretary's authority to contract with individual water users (*Fox v. Ickes*, 137 F. (2d) 30 (U. S. C. A. pp. D. C., 1943)); (b) the valuation of reservoir and power sites (*United States v. Washington Water Power Co.*, 135 F. (2d) 341 (C. C. A. 9, 1943)); and (c) the limits of State and Federal authority in interstate streams (*Nebraska v. Wyoming and Colorado* (pending before U. S. Supreme Court)). Except for an adverse decision in the intermediate appellate court in the case of *Fox v. Ickes*, the cases which reached decision were won.

The legal work of the Grazing Service has been accomplished under unusual difficulties due to the fact that three chief counsel have been on duty during the course of the fiscal year, one having entered the military service and the second having retired because of ill health. However, the legal work was current at the close of the year.

INDIANS

The task of keeping Indian property in the hands of the Indians demanded legal action by the Indian Division on a wide front against

a variety of adversaries—defaulting lessees, adverse claimants under old railroad grants, State tax collectors, and ordinary trespassers. The policy of congressional protection of Indian homesteads was put to the test in argument before the Supreme Court in the case of *Board of Commissioners v. Seber* (No. 556, Oct. term, 1942, decided April 19, 1943), in which tax officials of Oklahoma sought to deny the Constitutional power of Congress to exempt Indian homesteads from State taxation. The argument of the Solicitor in support of congressional power was upheld by a unanimous court. He registered a less complete success in the case of *Oklahoma Tax Commission v. United States* (Nos. 623, 624, 625, Oct. term, 1942, decided June 14, 1943), where the court upheld the exemption of restricted lands in Oklahoma from State inheritance taxation but, by a five to four vote, declared restricted funds to be subject to such taxation in the absence of clear congressional enactment to the contrary. Other important Indian litigation included *United States v. Garaventa Land and Livestock Co.*, 129 F. (2d) 416, upholding the right of the Pyramid Lake Indians in reservation lands occupied for many decades by squatters; *Arenas v. United States*, — F. (2d) —, upholding the tribal status of Palm Springs Reservation lands; and *United States v. Santa Fe Pacific Railroad Co.*, 314 U. S. 339, in which, following a favorable decision in the Supreme Court (1941) further proceedings were initiated in the trial court looking to the recovery of land and damages under the formula established by the Supreme Court. While the protection of Indian rights of property and personality represented the most important part of the work of the Indian Division, the exigencies of war placed upon the Division a number of special responsibilities involving the maximum utilization of Indian resources in the program of war production. During the current year the backlog of old cases which once acted as a drag upon the application of legal energies to current problems was substantially eliminated and the work of the Indian Division is now on a current basis.

The Legal Division of the Office of Indian Affairs, in addition to its usual load of routine legal business, had to handle a number of peculiarly complex problems arising out of the war. The acquisition of extensive Indian lands for military purposes created not only difficult problems of land acquisition but equally difficult problems relating to the resettlement of the Indians concerned. A task of peculiar complexity handled by the Legal Division of the Indian Office was the negotiation of many-sided agreements with Indian water users and others to make possible diversion of water required for production of badly needed copper in Arizona. The Probate Division of the Indian

Office, despite severe setbacks through loss of personnel to the armed services, and by reason of the moving of its offices and records to Chicago, managed to keep its work close to a current basis and to take on a considerable increase of jurisdiction conferred by the act of December 24, 1942 (Public Law 833, 77th Cong.) which transfers probate jurisdiction over small restricted estates of Five Civilized Tribes Indians from the State courts to the Secretary of the Interior.

Division of Information

ROBERT W. HORTON, Director

DURING the past fiscal year the Division of Information has maintained in skeletal form the editorial, photographic, radio and publication sections authorized by Congress in 1938.

Dissemination of official information through the daily press, the radio, pictures and in printed publications generally has been limited to the preparation and distribution of such pertinent facts and regulations as those dealing with the Federal administration of the Nation's coal mines, and to information concerning the Department's programs for the development and conservation for war purposes of metals, power, oil, fuel, helium, food, land, water, and timber.

Important economies in the use of postal facilities and paper supplies were effected during the year, and the distribution of all publications of the Department was restricted to conserve manpower and materials. The educational work of the motion-picture unit, drastically curtailed during the fiscal year ending June 30, 1942, was suspended this year for the duration of the war.

RADIO SECTION

With the increasing use of radio in those United Nations' war activities which originate in this country, the Radio Section with its modern broadcasting and recording studios, proved of great value to many agencies of the Government.

Within the past year, the Radio Section has cooperated in the preparation or production of radio and transcription material with the following agencies and offices: Navy Department, War Department, Coordinator of Inter-American Affairs, the Public Health Service, the Office of Education, Bonneville Power Administration, Bureau of Reclamation, National Capitol Parks Service, Petroleum Adminis-

tration for War, Solid Fuels Administration for War, Federal Coal Mines Administration, War Manpower Commission, Office of War Information, Department of Agriculture, Office of Strategic Services, State Department, Labor Department, Federal Securities Agency, Office of Civilian Defense, and the U. S. Maritime Commission.

PHOTOGRAPHIC SECTION

The photographic laboratories furnished a considerable number of documentary photographs to the various offices and bureaus of the Department, thereby creating a savings of thousands of words of descriptive matter in official reports and scores of work-hours on the part of Interior employees. Illustrations and pictures produced in the laboratories proved to be of great value from a documentary standpoint before congressional committees, in conducting investigations, in promoting morale, in keeping the public informed of the progress of Departmental war projects, and in many other ways.

The personnel of the photographic unit, in addition to their work for the Department, cooperated with outside Government agencies in the production of material involved in their war programs. Photographic work turned out during the 12 months included educational pictures for textbooks, guidebooks, pamphlets and travel literature requested by scientific, trade, and general circulation magazines and publishing organizations.

PUBLICATIONS SECTION

The functions of the Publications Section have been so realigned that it may operate more logically as part of the Division of Information. The Section now takes part in the issuance of publications as an editorial consultant and publisher, instead of functioning, as it formerly did, mainly as a liaison office between the Department and the Government Printing Office. The result is that a unit of the Division of Information now concentrates upon the essential parts of our publications, (the material and the manner of presentation) instead of mere physical appearance.

Interior Department Museum

H. L. RAUL, Museum Curator

THE Interior Department Museum illustrates graphically to the public the accomplishments of all of the Bureaus of the Department. Its exhibits are continually in process of change or modification so that bureau activities and progress will be reflected. The museum visualizes and explains the history and organization, as well as the current activities of the Department, and serves in maintaining contact with the public through a progressive program which is carried out in cooperation with the bureaus and by direct contact with the public.

Approximately 50,000 persons visited the museum during the past year. The Visitors' Register recorded visitors from every State in the Union, and from Alaska, Hawaii, Puerto Rico, Argentina, Australia, Canada, Chile, China, Colombia, Cyprus, Egypt, England, Guatemala, Mexico, Peru, Uruguay, and Venezuela.

With the assistance of the Bureau of Reclamation, the Reclamation exhibit gallery has been extensively redesigned and the installations have been completed. Included are a large mural painting of more than 12 feet in length by Kathryne C. Dimmitt representing Grand Coulee Dam, together with a scale-model of Grand Coulee Dam. Another new scale-model shows a typical concrete cooling system.

The museum during the past year has, upon request, cooperated with numerous agencies, including the National Archives, Smithsonian Institution, The Boston Art Museum, Junior Board of Commerce of Washington, and The American Society of Civil Engineers. Assistance has been rendered to school organizations and other groups in preparing study courses relating to Conservation, the National Parks, Reclamation, and other subjects in which the Department is engaged.

An animated diorama recently installed in the Bureau of Mines gallery illustrates Bureau of Mines inspectors at work in a mine. A silhouette, which is 6 feet in length and which depicts the methods employed in early surveys of the public lands, was designed in the museum and installed in the General Land Office gallery.

New books which have been added to the museum collection, include *The Biography of William Howard Butler, 1856-1934*, painter of the full-length portrait of Gen. Hugh Lenox Scott, now in the possession of the Department, and the recently issued *Catalog of the Type Specimens of Mammals in the United States*, by Arthur J. Poole and Viola S. Schantz of the Fish and Wildlife Service. A conversion lens extension for the sound-motion picture equipment has been supplied by the Bureau of Mines for the special showing of educational films of the Bureau.

A quantity of exhibit material has been received from the Division of Territories and Island Possessions and from the National Park Service.

The special exhibits displayed during the year included a panel containing the text of the Atlantic Charter; panel exhibits showing the flags of the United Nations, and the flags and coats-of-arms of the American Republics. Another special exhibit of general interest featured the Seal of the Department of the Interior together with stamps relating to the Department and events in the history of the United States. A retrospective special exhibit was designed to include a group of historic prints made from original photographic negatives taken by the late William Henry Jackson (1843-1942), official photographer of the United States Geological Survey, and member of the historic Hayden expeditions of 1871-72. The early Jackson photographs, made with cumbersome wetplate cameras carried on muleback, were largely instrumental in influencing the act of Congress which established Yellowstone National Park, the first park of the great National Park System of the United States. Also among the special exhibits shown during the year was a rare cormorant and wolverine parka, made by Eskimos at Mekoryuk village on Nunivak Island, Alaska. Another timely exhibit, included an elaborate display in three exhibit cases in the Geological Survey gallery showing specimens of strategic minerals from which are produced the metals required for the construction of war implements. Many relatively rare minerals shown are of vital importance in the production of essential war materials.

The specimens displayed were indicative of results obtained in the intensive search for additional sources of these minerals in the United States, Alaska, and Latin America.

Conducted tours of the museum galleries were held throughout the year for teacher groups, and public and private school classes.

Since its establishment by the Secretary, on March 8, 1938, as a new instrument in the field of Government-public relations, the museum has been a focal point of educational interest in the Nation's Capital. It has grown in usefulness to the Department and in popularity with the public.



Civilian Conservation Corps

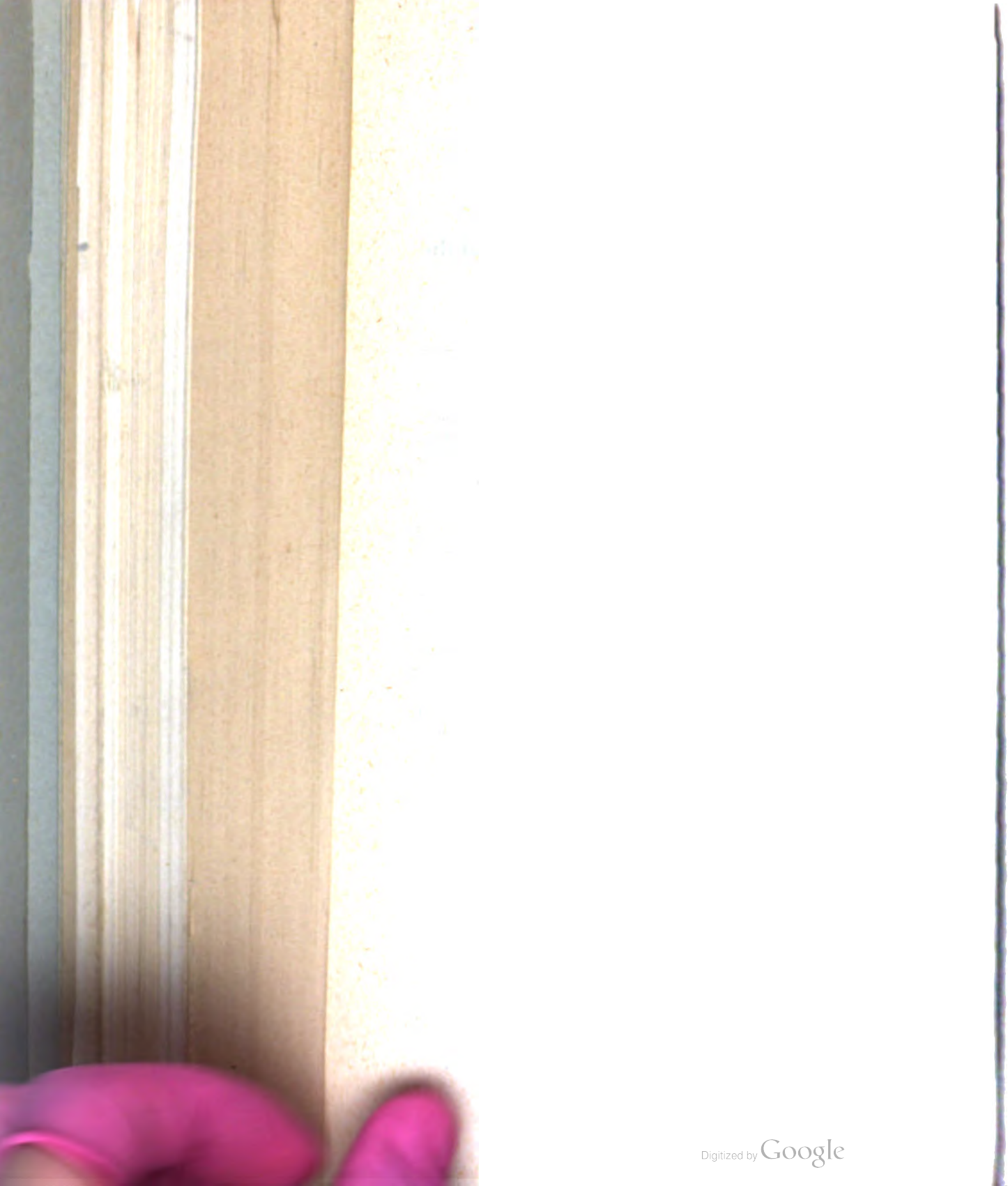
CONRAD L. WIRTH, Representative, Department of the Interior, Advisory Council, CCC

LEGISLATION abolishing the Civilian Conservation Corps was passed on July 2, 1942. The appropriate bureaus of this Department acted promptly in accordance with Title II, Public Law 647, Seventy-seventh Congress, and with instructions of the Director of the CCC which provided for the immediate disbandment of active camps, the separation of personnel and prompt disposition of property. These agencies, that is, the General Land Office, the Office of Indian Affairs, the Bureau of Reclamation, the National Park Service, the Grazing Service and the Fish and Wildlife Service, had virtually concluded all of their CCC affairs by the end of the fiscal year.

The largest and longest task was to inventory, offer, and transfer all CCC properties in possession of the Department, including camp buildings and their operating accessories, automotive and other heavy construction equipment, light equipment, tools of all kinds, engineering equipment and supplies, office equipment, furniture and supplies and in many cases beds, bedding, kitchen and dining room equipment, food, etc. These properties were transferred to the War Department, Navy Department, and Civil Aeronautics Administration for war use or, in succeeding priorities, to other Federal agencies, to State, county, municipal agencies, and nonprofit organizations for the promotion of conservation, education, recreation or health.

Excluding camp buildings, which were credited to other accounts, CCC properties transferred by the six concerned bureaus of the Department of the Interior during the fiscal year 1943 were as follows:

General Land Office.....	\$147,867	Grazing Service	\$1,555,483
Office of Indian Affairs...	3,859,944	Fish and Wildlife Service..	1,730,320
Bureau of Reclamation...	836,887		
National Park Service....	8,347,256	Total.....	16,477,757



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Annual Report

OF THE SECRETARY OF THE INTERIOR

1944

POST-WAR FRONTIERS EDITION



The seal of the Department of the Interior is a circular emblem. It features a bison in the center, facing left, with a sunburst rising behind it. The words "DEPARTMENT OF THE INTERIOR" are inscribed around the perimeter of the seal.

Annual REPORT

*of the Secretary of the Interior
for the Fiscal Year Ended June 30*

1944

Post-War Frontiers Edition

**UNITED STATES
DEPARTMENT OF THE
INTERIOR**

HAROLD L. ICKES

Secretary

UNITED STATES GOVERNMENT PRINTING OFFICE, WASHINGTON, D. C.
For sale by the Superintendent of Documents, Washington 25, D. C. Price 45 cents

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Secretaries of the Interior

from March 8, 1849 to June 30, 1944

Harold L. Ickes

Mar. 4, 1933, continuing in office
June 30, 1944

Ray Lyman Wilbur

Mar. 5, 1929 to Mar. 4, 1933

Roy O. West

July 25, 1928 to Mar. 4, 1929

Hubert Work

Mar. 5, 1923 to July 24, 1928

Albert B. Fall

Mar. 5, 1921 to Mar. 4, 1923

John Barton Payne

Mar. 15, 1920 to Mar. 4, 1921

Franklin K. Lane

Mar. 6, 1913 to Feb. 29, 1920

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Letter of Transmittal

The Secretary of the Interior

Harold L. Ickes, Secretary



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During the past fiscal year, we have concentrated upon those facilities that provide the necessities of war from the natural resources. We have hastened the construction of huge dams and the installation of generators to furnish power for war production plants. We have extended our irrigation facilities to increase the production of food for war. We have developed and improved technological processes to account for more fuels and minerals for war and to produce them faster.

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A glance at a few of this Department's developments indicates how enormous they are in the aggregate. The Department's installed capacity for the generation of hydroelectricity at the end of the fiscal year was nearly 2,500,000 kilowatts, roughly three times the entire developed capacity in South America in 1935, or one-half of that in Asia (including Soviet Asia), at the same time. We generated 13,747,000,000 kilowatt-hours of electricity during the past fiscal year, about four times the amount that was used in Michigan in the manufacture of automobiles and automobile parts in 1939. We irrigated more than 4,000,000 acres of land, equivalent to the acreage that is planted to crops in Louisiana in a normal year. We have affirmed the presence of so many large deposits of essential ores that the effect would not be different if we had annexed a couple of mineral-rich States.

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Our job soon will be to turn this vast block of power from war to peace. It is a Herculean job but I think that we can master it by shifting, gradually if possible, from war to its nearest economic equivalent in the field of conservation; namely, regional development. But it must be regional development at its boldest. The program must embrace entire areas, usually the basins of great rivers and their tributaries; it must provide for full and unified development of all of the resources within the region, and an ideal program would call for simultaneous attack upon all phases of the job.

There is scarcely a facility of ours that is now producing for war that could not be put to use in such an undertaking. It would absorb such material developments as dams and such tributary activities as surveys and metallurgical processes. The benefits of such a project would be so widespread that, in my estimation, they could easily hold community interest and effort together in the post-war years.

Working in a typical region under a program for unified and simultaneous development, we would provide for irrigation at the upper reaches of a river, for deep-water navigation as far upstream as would be practicable, for barge transportation above that point, and for flood control wherever floods occur. We would impound water for municipal supply, generate hydroelectric power and transmit it for use in factories and homes and on farms. We would determine the location and volume of the ores and the bases of plastics that are amenable to processing or manufacture by means of electricity, and improve the means of processing them. We would forestall or ameliorate the pollution of streams, safeguard the soil against erosion, protect wildlife, and develop recreational areas.

Considered as a means of transition from war to peace, conservation unitized on a great scale, is especially timely, but I think that it is to be commended as well for other reasons. In the long view it is the most economic procedure. When we plan all phases of the job as one we foresee some of the frictions that might develop between one facility and another, and dispose of them in the planning stage. That is where alterations are cheapest. We discover others and correct them at the next cheapest point—early in our operations. By committing ourselves to the development of all of the resources of a region we preclude those conflicts that result from a commitment to half measures; conflicts, for example, between those who would profit and those who would suffer if we generated power for industry without providing against the pollution of the rivers. We reap another advantage in the tendency of each phase in a large-scale development to assist each other phase and to assure its success. A navigable river may join with power in attracting industries that need cheap transportation for raw materials and heavy output.

The advantage of reciprocal benefits among facilities was demonstrated, as on a prearranged proving ground, in the Pacific Northwest where the demands of war production—not our own independent planning—drew our numerous, large, and dissimilar developments into a close-knit unit. The primary need was for hydroelectric power to energize the region's war production plants. But plants needed more ores and deposits that were easy of access. They required water for processing and for municipal supply in the new communities that grew up around new industries. They required improved metallurgical processes and pilot plants and laboratories in which these processes might be proved. In response, we affirmed the presence of iron ores that were a thousand miles nearer than the usual supply, and, as nearby as Arkansas, we disclosed huge new additional deposits of bauxite for urgently needed aluminum which, otherwise, would have had to be shipped from Dutch New Guinea. In many other ways we responded to the region's needs by unitizing our facilities. We have been justified already by a magnificent record in war production in the Pacific Northwest, and we may be justified again by that region's readiness to seize any opportunity that peace may offer for continued functioning. It is ready precisely because its developments are a unit. The functioning of no facility would be delayed for lack of supporting facilities.

Other regions are equally in need of coordinated development of their natural resources. The hurried demands of war production merely dramatized the need in the Pacific Northwest. There are vast areas throughout all of the West in which great potentials would be realized by similar coordination. If we launched a program of full measure to make actualities of these potentials, we might require stronger implementation, but we would not have to strike out on new lines in the field of conservation. From its beginnings this Administration has proceeded in that direction. We have sought better coordination in the development of our resources, and we have assumed increasingly greater responsibility for the equitable distribution of the resulting benefits among the greatest possible number of persons.

You will recall that we requested the return of the Bureau of Mines to the Department to team with the Geological Survey, and that under your second and third Reorganization Plans we brought in the Bureau of Biological Survey and the Bureau of Fisheries, and consolidated them as the Fish and Wildlife Service, the better to unify our conservation program. We proceeded toward the same goal in establishing such new agencies as the petroleum Conservation Division, and in organizing centralized controls such as the Office of Land Utilization. We have consistently shaped our policies toward an equitable use of the natural resources. We have rejected the old conception of a dam

as principally an irrigation project which yields some incidental by-products. We plan each dam with the maximum development of all of its potentials in mind. We have discarded the policy of selling the power from our dams at the busbar and thereafter washing our hands of the deal. Instead we coordinate the production and the transmission of power, carrying electricity over our own transmission lines, and only to those distributors who agree to relay the benefits of large-scale development to the consumers. When we assumed the new function of improving the Federal Range under the Taylor Grazing Act we also provided for the equitable distribution of the resulting benefits by the regulation of grazing on the improved lands.

If we have not been able to unify our facilities at the rapid rate at which we have developed them throughout the emergencies of defense, and war, we have at least prepared for their later unification to the extent that such effort has been possible. We have carried power for war production by preference to points at which it is most likely to be used tomorrow for industrial production. We have established relationships with industry that will facilitate the employment of our metallurgical process and our studies in peacetime pursuits. By means of surveys we have amassed a great volume of data that will assist industry in picking up our hydroelectric power for use when war production ends.

We have also shaped our program to respond to the Nation's needs outside of the field of conservation, mainly by devising a large-scale work program to reemploy returning service men and demobilized war workers. But, in addition, we have sought to provide settlement opportunities in the West and in Alaska. We have carried on research that will give settlers a better chance than their predecessors to succeed on the public lands, and we have asked, or are preparing to ask, for specific legislation that will assure the successful settlement of Alaska where we are committed by circumstance to the most rapid development that has ever occurred there.

We have accumulated these vast assets at a minimum cost when it is considered that we return to the Government in cash receipts about 70 percent of the sums which are appropriated to us. We are tending toward an even greater return, and we have an excellent chance of achieving it if the Congress will appropriate for us relatively small sums with which to complete certain facilities that will earn revenues when they are finished and put to use.

A number of our developments that are well under way, and which represent an investment of about \$100,000,000, are not earning revenues now because we lack relatively small additional funds to pay for completing them. The money which the people have invested in these developments is lying idle when it might be paying dividends in both service and earnings.

Often the lack of a small appropriation to complete a large development does more than merely defer the earning power of an investment: it results in seriously diminishing the investment. To take a specific instance, we have expended about \$25,000,000 on the Marshall Ford Dam, but for lack of about \$126,000, which the House refused to appropriate, we are unable to safeguard the equipment and machinery of that project. The electrical equipment and some other facilities have been damaged by the condensation of moist air in the galleries of the dam, and other equipment and machinery is endangered.

Despite these crippling handicaps and others, our Bureaus have worked together as one department to clear a course for the future while meeting the exacting demands of the moment.

THE BUREAU OF RECLAMATION

Working within the Bureau of Reclamation we contributed mightily to the needs of both war and peace. We provided the power that started many critical shiploads of matériel from assembly lines toward battle fronts where those supplies spelled the difference between victory and defeat. Our service men and women have been better clothed and better fed as a result of foods and fibers that were grown on land which we irrigated. And many returning service men will find a well-planned reclamation program that will help them to reestablish themselves in civilian life—provided that funds and legislative authority are granted.

The framework for that post-war program was completed during this fiscal year. It consists of an inventory of more than 236 irrigation and multiple-purpose projects which can be constructed to create emergency employment and homes on self-sustaining irrigated farms for war veterans and others.

The Bureau carried forward the preparation of the inventory while greatly increasing the production of its 31 power plants on projects in 12 western States and while increasing the crops that were essential to the war program on the 4,000,000 acres which our irrigation systems serve. The outline was presented to the Senate Committee on Post-war Economic Policy and Planning which is seeking the means for a smooth transition from the economy of war to an economy of peace. While the program was prepared to assist in this transition the development of western land and water resources which it proposes would result in lasting benefits—new farms, new homes, new industries, and new cities.

The construction contemplated would provide employment equivalent to 1,250,000 men working for a year—44 percent of them at the site of construction, and 56 percent in the manufacture and transportation of equipment and supplies in every State in the Union. Ap-

proximately 135,000 new irrigated farms would be created and the livelihood of more than 150,000 additional families would be stabilized in regions in which a maximum crop production is uncertain because of a deficient water supply.

The new irrigation systems would serve 6,705,000 acres of new land and furnish supplemental water for an additional 9,364,000 acres of land, now without adequate irrigation supplies. The same reservoirs that would impound the storage water for this irrigation would make possible the addition of 1,765,000 kilowatts of power on existing or authorized projects and would make available 2,579,000 kilowatts of firm power capacity, on projects that are under investigation.

The inventory, surpassing in scope any other program that the Bureau has presented in its 42-year history, was prepared in recognition of the fact that approximately 3,000,000 returning service men, demobilized war workers and others in the West will seek employment. More than 260,000 of this number will be fitted by training and experience to undertake farming on irrigated land.

Furthermore, the program is well suited to meet the need for intensified reclamation in the West. In the 11 far-western States the population increased about 60 percent from 1920 to 1940, while the increase in irrigation has been less than 10 percent. The extension of irrigation, as outlined in the inventory, would increase the purchasing power of the West for products that are produced elsewhere by \$1,250,000,000 annually.

The construction cost of all of the projects in the program would be nearly \$3,000,000,000 on the basis of 1940 prices. An expenditure of \$793,000,000 would be required to complete the 40 projects that are authorized or under construction, so that work on them could be undertaken or intensified immediately. Most of the program consists of potential projects, many of which would require special legislation before construction could be undertaken. Substitutions may be made in the list as surveys of projects and basins are completed.

Approximately 170 irrigation and multiple-purpose projects, and 50 river basins and sub-basins, were under study during the year. Seventy-eight detailed field reports which involve construction that would cost \$547,000,000 are ready to put into effect.

The Bureau's peacetime planning for the orderly agricultural and industrial development of the West and for its accelerated wartime activity continued to bear fruit in the field of power and crop production. There were spectacular additions in our power installation in the fiscal years 1942 and 1943, but achievements during 1944 surpassed even the records of those years. More than 500,000 kilowatts of new power capacity—exceeding the total pre-war installation of the State of Nebraska—were added during the year, the greatest expansion of this kind by a single organization in a single year. Our total

installation of approximately 2,360,000 kilowatts exceeds Reclamation's pre-Pearl Harbor capacity by 1,330,000 kilowatts. The additions that the Bureau made during the war in the 11 far-western States constitute 84 percent of the expansion made in the area by all systems.

The power output matched the unparalleled increases in rated capacity. Approximately 14,500,000,000 kilowatt-hours of energy—a 52 percent increase over the preceding year—were produced. Nearly all of the new energy made available played a direct part in war production. The war industries in the Pacific Southwest were dependent for 50 percent of their power on Boulder, Parker, and other Reclamation installations. The world's largest magnesium plant used a fourth of Boulder's huge 6,333,000-kilowatt-hour output, and aluminum plants took a major portion of the power of Grand Coulee Dam in the Pacific Northwest.

Gross revenues from the sale of Reclamation power reached a new high of \$18,992,000, an increase of \$4,438,000 over the fiscal year 1943. These returns are highly significant to the Reclamation program. Power revenues will repay half of the investment in projects that were outlined at the beginning of the war.

Reclamation's contribution of food for war was increasingly impressive. Increases in 2 basic crops indicated the spirit in which the Bureau and the farmers on its 44 irrigation projects responded to the threat of a food shortage. Potato production in the calendar year of 1943 increased by 52 percent over 1942, and bean production increased by 23 percent.

The potato output was sufficient to provide a year's supply for 31,000,000 persons, and the bean yield to serve 30,000,000. Alfalfa production was also at an unprecedented high. This crop, fed to beef and dairy herds, would provide annual rations of milk for 4,800,000 persons and a yearly supply of beef for 5,500,000 persons.

The acreage in production, the total volume of crops, and the crop values also increased. A total of 4,055,329 acres was served a full or partial supply of water by Bureau systems. These lands produced 10,660,000 tons of food and forage crops, which were valued at \$388,670,969. Eighty-three percent of the area for which the Bureau was prepared to supply water was in cultivation.

Despite the continued restrictions on critical materials, and on manpower for irrigation construction, the Bureau made progress in bringing water to land on which agricultural production could be increased. Under the war food program, the War Production Board issued clearances that will bring under irrigation 243,657 acres of new land and will provide supplemental water to 1,022,125 acres that are handicapped by shortages in moisture. All authorizations were granted in

the fiscal year except for four projects on which work had previously been cleared.

The Reclamation service of providing municipal-industrial water also aided in the prosecution of the war. Supplemental supplies were served to important municipalities, in which the demand was increased by an influx of industrial workers, and to major war industries, including a \$200,000,000 steel plant near Provo, Utah, and the world's largest magnesium plant at Basic, Nev.

At the close of the year the Bureau had in operation, under construction, or authorized, 78 projects in 16 western States. In nearly all of this area rainfall is inadequate for sustained crop production and hydroelectric power is the main driving force in industry. The area that was served by the 52 Bureau projects that delivered water or produced power is populated by more than 5,000,000 persons.

DIVISION OF POWER

As we enlarged our hydroelectric installations and increased our flow of power, new complexities arose in the fields of operation and marketing. The increase in our own installation and production was, in itself, enormous; and on September 1, 1943, the power from the Grand River, Norfolk, and Denison dams was added to our own, bringing the total of more than 3,000,000 kilowatts of installed capacity.

Consequently, we assumed a heavier burden of work and responsibility in the Division of Power. Here we strove, in operating our system and in marketing our power, to prepare for transition to a peacetime economy while meeting the immediate interests of a Nation at war.

This Division organized the Southwestern Power Administration to operate the Grand River Dam and to market the power from the three dams that added their output to ours. This agency, created by authority of Executive order as a wartime measure, is now in full operation.

In the Division of Power as a whole our activities were especially directed toward the establishment of rate schedules and the negotiation of power sales contracts. The Division reviewed or participated in the establishment of a number of rate schedules and in the negotiation of various contracts for the sale of power by the Bonneville Power Administration, by the Southwestern Power Administration, and by the Bureau of Reclamation, and helped to establish rates for the sale of power from the Fort Peck Dam, which was turned over to the Bureau of Reclamation for marketing. Most of the contracts were negotiated on a war duration basis.

The Division also took an active part in determining the allocation of the costs of the Grand Coulee Dam as one step in the ultimate establishment of rates for the sale of Grand Coulee power. Closely allied

to the Coulee allocation are the studies, participated in by the Division, regarding the Central Valley project of California. These were undertaken to determine the best method and the rates at which benefits from the project will be made available to the people of California.

In anticipation of the time when the need of power for war will cease and industry can return to peacetime production, the Division has given considerable attention to the preparation of post-war plans and programs. It has participated in studies that concern the further development of the river resources of the Nation, and in this pursuit it has given much assistance to congressional committees and to individual members of Congress. Attention has been devoted to the problem of the conversion and disposition of Government-owned war plants, and to the establishment of peacetime industrial economies which would be based upon the liberal use of low-cost power. Discussions also have been initiated concerning the disposition of fuel-operated power plants that were constructed during the war for use of Military Establishments. The objective is the incorporation of these fuel plants into the facilities of Federally owned hydroelectric plants as a means of economically providing peaking power or standby power which must now be purchased. In the event that Congress passes legislation authorizing the delivery of power to the Secretary of the Interior for marketing from dams constructed by the United States Corps of Engineers, it is also anticipated that the Division will be called upon to undertake the organization of additional marketing units to dispose of such power.

THE BONNEVILLE POWER ADMINISTRATION

In the Bonneville Power Administration we have also worked toward the restoration of the Nation's industrial balance after the war. The wartime industrialization of the Pacific Northwest has contributed much toward this end. It is widely recognized both throughout this region and the Nation that these gains must be fostered in the interest of a sound economic posterity.

From its inception the Bonneville Power Administration's activities have been planned upon the fundamental idea of regional development. Through the war years, the acceleration of the Government's transmission grid construction program to serve war industries at the same time has provided, some years in advance of schedule, a potent tool for both reconstruction and regional development. In making available low-cost hydroelectric power to the people of the Pacific Northwest, the Bonneville Power Administration is earning both the confidence of the people of the region and a sound position of leadership in regional developmental programs.

Conscious of the responsibilities which attend such a position of leadership, and in order that the policies set forth by Congress in the Bonneville Act might be carried out to the fullest possible degree, the

Administration has established certain guiding principles or objectives in the interest of securing the greatest possible benefit from the resources of the region for the greatest number of people. Briefly, these objectives are as follows:

To make power a tool for true development.—The cheap and abundant electric power of the region must become the means for opening new opportunities for investment, enterprise, and employment—for agriculture, for new industries, for small business and for the home owner.

To provide larger quantities of power at lower rates, thereby increasing over-all consumption. The development of the resources of the region through the use of power as a public enterprise provides a vital ingredient for establishing a sound economic base for private enterprise.

To create new jobs in enduring projects for returned servicemen, demobilized war workers, and others. There will exist a readjustment problem for some 500,000 workers in the Pacific Northwest alone when the war is finished.

To add new wealth creating activities to the taxable wealth of the community. In the final analysis, the economically secure community is the very foundation for solvent national Government.

To establish a higher general standard of living.—With the distribution of abundant low-cost hydroelectric power throughout the region, living can become more enjoyable and work can be made easier for farm dwellers and city dwellers alike.

To insure the national investment in developmental projects of the region. The multiple benefits of the dams and the transmission system which the Federal Government has built—reclamation and irrigation of thousands of acres of formerly unused farm lands, widespread distribution and sale of facilities for bulk freight movement on our rivers—will provide full protection for the taxpayers and full payment of their investment, besides accomplishing the basic objectives of regional development and the enhancement of our national economic position.

As to the feasibility of proceeding toward the foregoing objectives, a recapitulation of the progress that the Bonneville Power Administration had made at the end of the fiscal year affords substantial demonstration:

Approximately 45 percent of all of the electric energy that was consumed in the five Pacific Northwest States of Oregon, Washington, Idaho, Montana, and Utah during the 12-month period ending June 30, 1944, was supplied by the two Federal power plants at Bonneville and Grand Coulee Dams.

During fiscal year 1944, the Bonneville Administration sold 8,741,106,000 kilowatt-hours of electric energy at a total cost to its customers

of \$20,893,363, or an average of 2.39 mills a kilowatt-hour. The rapid growth of the Bonneville Power Administration to its present position as one of the three largest power marketing agencies in the Nation is shown clearly by a comparison with fiscal year 1939 power sales, which totaled only 30,042,911 kilowatt-hours at a cost of \$49,835. The output of the Bonneville and Grand Coulee power plants is averaging between 25,000,000 and 30,000,000 kilowatt-hours a day, or approximately 10,000,000,000 kilowatt-hours a year.

During the 6 years beginning in the fiscal year 1939, when the first generators at Bonneville dam were placed in operation, the Bonneville Power Administration had sold 17,927,787,000 kilowatt-hours with revenues amounting to \$40,885,633. This record of service evidences not only a material contribution to the progress of the war but also a substantial participation in strengthening the industrial and economic base of the region.

THE SOUTHWESTERN POWER ADMINISTRATION

Our war and post-war policy has been further reflected in the work of the Southwestern Power Administration. Although conditions may change before we are able to foresee them, this Administration is designing a construction program to provide carrying capacity which will be essential to our post-war operations. Changes in the program may be necessary before it can be carried out. But the basic plan is being drawn in anticipation of a definite need.

Through the year this Administration provided adequate power and continuity of service at the lowest rates that were consistent with reasonable economic requirements. The average rate was 4.21 mills per kilowatt-hour, and, since approximately 95 percent of the power delivered went to war industries, this low rate has resulted in a decided saving to the tax payer. It has enabled industries to provide essential war needs more economically.

Power continued to flow to the great aluminum reduction plant near Lake Catherine, Ark. In this service to the aluminum plant this Administration continued to operate and maintain 200 miles of transmission lines, constructed and owned by the Ark-La Cooperative of the Rural Electrification Administration. Delivery of power was continued to the Oklahoma Ordnance Works for the manufacture of explosives and also to Camp Gruber, an Army cantonment near Braggs, Okla. The Administration furnished power, as we had previously, to municipalities and Rural Electrification Administration Cooperatives which, in turn, furnish it to war industries.

The Administration pursued its system-interconnection policy with private utilities which aided them in fulfilling their power commitments without service interruptions.

Construction progressed on the Grand River Dam project. A new field headquarters building was erected at a central point, reducing operation and maintenance requirements to a minimum. Considerable protective work was performed in the area below the Pensacola Dam and transmission and substation facilities were extended to accommodate increasing war loads. A transmission line was built to serve a new rubber plant and telemetering with load control was installed for the project itself and for interconnection with the Southwest Power Pool. Under Presidential authority the flood control pool elevation was raised 5 feet at a cost of approximately \$2,000,000.

BUREAU OF MINES

Industry could scarcely be expected to put to immediate post-war use the power which we have generated for war if it had to proceed with prewar materials and prewar knowledge. The sources of some metals would be too distant from the source of power for economic use. Many of the techniques for mass production of heavy equipment by electricity would be undeveloped, and other formidable barriers would stand between our newly developed power and industry's ability to use it. The work that we have done this year in the Bureau of Mines has broken down many such barriers.

We affirmed the presence of mineral deposits that are near our biggest projects and we developed metallurgical processes. We adapted known resources and methods to meet the peculiar emergency needs for certain mineral substances, and we extended the collection and economic analyses of mineral market data.

The information obtained in these endeavors will find wide future application in peacetime, and so will the results of our studies and of our searches for metals, to which I already have referred. But these aids to our transition period resulted mainly, of course, from our response to the demands of war.

The prodigious outpouring of war equipment from the United States to foreign shores—which was assembled in Britain on D-Day and in many remote places at other times—was an enterprise in which the Bureau of Mines may justly claim a share of credit.

In the basic munitions-making field of iron, steel, and ferro-alloys, the Bureau added millions of additional tons of iron ore as reserves, and found deposits of steel-toughening ferroalloys such as tungsten and chromium, and important reserves of fluorspar for the flux that was needed in blast and open-hearth furnaces. The steel industry called for high-quality coke of uniform grade, and coke-oven operators, with technical assistance from the Bureau, provided it. The industry needed vast quantities of scrap metal, and the Bureau not only conducted extensive surveys to assist in scrap procurement, but

its field men helped to find it at abandoned and active mines and mills throughout the country. In addition, extensive research was conducted on sponge iron as a possible substitute for steel scrap.

In the important province of nonferrous minerals, the Bureau's exploratory crews added to the Nation's recoverable mineral resources several million tons of lead-zinc and copper ores, and a year's supply of mercury and commercially exploitable quantities of pegmatite minerals, including strategic mica, beryl, lithium, and tantalum.

We explored workable deposits of corundum, optical calcite, kyanite, sillimanite, celestite, barite, and block talc as the need for these minerals became acute.

Further exploration for the ores of aluminum added substantial tonnages of bauxite, alunite, and aluminous clays to the country's reserves.

Through intensive research in its experiment stations, demonstration plants, and pilot plants, the Bureau developed processes for utilizing ores from deposits that it explored and from other domestic reserves. Advancements were made in the methods of producing vanadium, manganese, chromium, zinc, lead, aluminum, and the various pegmatites and nonmetallics from ores and materials which often were of low-grade and complex nature. Other achievements of the year included the development of a process for producing titanium, a strong, corrosion-resistant metal; a method for producing magnesia, nickel, chromite, and silica gel from olivine, an abundant material which had defied utilization; and a procedure for obtaining magnesium compounds from dolomite.

Thousands of ore samples were analyzed for prospectors, claim owners, and industries, and a consulting service was maintained to advise those concerned on the feasibility of exploiting doubtful deposits. Cooperative research was conducted with industry. When significant discoveries or advancements were made in any of the Bureau's many fields of experimental work, they were reported at once to war agencies and industries concerned with procurement and production.

As coal shortages became acute, the Bureau made technical advice available to industry on the problems of coal mining—preparation, procurement, storage, and combustion. Coal-mine and coke-oven operators particularly were aided in improving their products. Large sums of money were saved for the Army, Navy, and other Government agencies, by analyzing samples to guide them in awarding contracts for fuel. The Bureau also trained Army personnel in coal sampling at posts throughout the country, and tripled its boiler feed water analyses to protect Army camp boiler plants. A national fuel efficiency program was undertaken to combat waste in the commercial and industrial use of all types of fuel and heat energy.

With military requirements dipping deep into domestic petroleum reserves and discoveries of new oil fields declining, the Bureau mapped out a long-range program of research in the production of synthetic liquid fuels from coal, oil shale, and other materials. This will involve the construction and operation of demonstration plants to provide a blueprint for private industry. Meanwhile the Bureau continued laboratory-scale investigations of the various synthetic fuel-making processes and gained widespread attention as the war rationing of gasoline made American motorists conscious of motor-fuel shortages. One pilot plant for the complete gasification of sub-bituminous coal and lignite was designed, built, and successfully tested in 1944, and another was under construction.

The completion of three new helium plants increased the total to five, enabling the Bureau to meet every demand of the armed forces and to release large quantities of this lightweight, nonburning "miracle gas" to scientific, medical, and industrial consumers. The United States enjoys a world monopoly of helium, but the supply is not inexhaustible. However, an adequate reserve for the future is assured by the Bureau's conservation plan in which helium, extracted from natural gas going to the commercial fuel market, is returned to the original subterranean vaults for storage until it is needed. Official recognition of the Bureau's extraordinary achievements in helium production for war came in January 1944, when the Army-Navy "E" was awarded to the plants at Amarillo and Exell, Tex.

Charged with the seemingly paradoxical tasks of helping supply more oil for war and prolonging the life of the Nation's natural crude-oil deposits, the Bureau achieved both. Research disclosed new sources and improved the quality of ingredients that were needed to increase the production of high-octane fuel for war planes, toluene for explosives, and other petroleum products. At the same time, application of the modern engineering principles of secondary recovery extended the period in which the United States can depend upon petroleum reserves as its main source of liquid fuels. A number of surveys were made of oil field practices and reservoir components, and more than 40 engineering reports were submitted to the Petroleum Administration for War, operators, and others who were concerned with meeting the war needs for special lubricants, fuels, and chemicals.

Wartime shortages of labor and equipment, longer working hours, and the need for greater production called for increased emphasis on the Bureau's health and safety programs in the mineral industries. Safety experts trained thousands of workers in first aid and in mine-rescue and accident-prevention procedures. Approximately 3,000 coal mines in the United States and Alaska had been surveyed for safety conditions and practices, many for the second time, and Federal inspectors reported thousands of improvements that protect life and

property. The effect of these precautions was demonstrated as accident-frequency rates in reinspected operations declined about 6 per cent and as the industry's fatality rate reached the lowest point in coal-mining history. Achieved despite adverse conditions related to the war, these gains foretold greater attainments after victory. The opposition expressed by many operators to the legislation and the early phases of the coal mine inspection program turned to praise and wholehearted cooperation.

Cooperating with the Bureau's wartime plant-security programs, the mineral industries' record was not blemished by a single clear-cut case of sabotage. Under the Federal Explosives Act, the Bureau inspected stores of nonmilitary explosives and licensed the manufacturers, distributors, and users of nonmilitary explosives and their ingredients. The mineral production security program was so effective that it was curtailed after Bureau engineers, trained in the prevention of sabotage and of subversive activities, examined mines, mills, and smelters to suggest suitable precautions.

Thousands of chemical analyses and explosives control tests were made in the Bureau's laboratories, the majority of them for the Army and Navy. To promote safety in the manufacture and handling of explosive and inflammable materials, experiments were conducted to determine the characteristics of military pyrotechnics, explosives, powdered metals and plastics, coal dust, vapors, gases, and liquids. Gas masks and other respiratory devices were tested, and inspections were made to improve hygienic conditions in mines, plants, and some Army Establishments.

Increasing requests from war agencies and industries for factual reports on minerals to guide their programs resulted in a further step-up in the Bureau's statistical services which already had been operating at high speed. The Bureau compiled up-to-date information on such subjects as domestic and foreign production, consumption, requirements, trade, uses, and stocks of mineral commodities. Many special studies were undertaken for the War and Navy Departments, War Production Board, Solid Fuels Administration for War, and Petroleum Administration for War, and many more will be required in the solution of national and international post-war problems.

THE GEOLOGICAL SURVEY

The Geological Survey prepared plans within the fiscal year for two related but distinct programs—one for the investigations and mapping that it should promptly undertake to provide the fundamental information required by the agencies that are now laying out plans for post-war construction and development projects, and the other for the long-range investigative and mapping program that it should undertake after peace returns.

The Geologic Branch has continued to devote itself very largely to studying deposits of minerals and ores that are needed in war, and to estimating the reserves and grades of these materials. Many thousands of deposits have now been examined, and the information obtained constitutes an inventory of the Nation's reserves of metals and minerals which is essential to peacetime industry as well as to the conduct of the war. A number of minerals at first considered critical in the war program are now known to be adequate in quantity, at least for the present, but the accelerated use of minerals to meet the war demands has resulted in a serious depletion of the reserves of many of the more common metals. A wise policy, therefore, demands that the national inventory of mineral reserves be intensified and kept current as new deposits are discovered and older ones become exhausted.

Among the outstanding war projects carried on by the Alaskan Branch was the continued compilation of aeronautical maps and charts for the Army air forces. The method of compilation from air photographs was largely devised by civilian members of its staff. By this trimetrogon method, so named from the camera lenses used, the Survey has furnished planimetric maps covering about 5,300,000 square miles of strategic area widely distributed throughout the world. The Branch has also prepared reconnaissance topographic maps of selected areas totaling more than 500,000 square miles.

Another important project has been the attempt to unify many of the activities concerned with the search for or development of Alaskan oil resources. Although these negotiations are still in progress, the Alaskan Branch has made a start on carrying out its part of such a program by sending five parties into the field to conduct such preliminary work as can be done within the limits of its regular appropriations.

Adequate topographic maps showing woodland coverage and highway facilities are a necessity in the successful waging of any war. The Topographic Branch has bent every effort to the making of such maps of vast areas of strategic importance within the United States and also in Europe and other theaters of war. Special topographic maps were made for Army maneuvers; for the investigation of critical minerals which are indispensable to successful military operations; for coal explorations; and for river utilization and flood control. Of great importance for the defense of our island possessions was the completion of the topographic mapping of Puerto Rico and Vieques.

The importance of water to both war and post-war activities has been emphasized by more than 5,000 requests made of the Geological Survey within the year for special reports on water in relation to problems that have arisen in the construction and operation of military, naval, and industrial establishments and in post-war planning.

These problems have involved the quantity and quality of the surface and ground water that was available or could be made available for use at hundreds of different sites in every State and in the Territories of Alaska and Hawaii. This important public service by the Water Resources Branch has been possible because of its mass of published and unpublished information which has been collected regularly for many years and supplemented by numerous special field investigations. The staff is decentralized, and it operates from about 100 field headquarters. Much of the work was done in cooperation with Federal, State, and municipal officials, who have aided materially in the solving of special problems. Water experts of the Survey have continued to serve with the armed forces, either as officers or civilians, in obtaining water for the Armies in the field.

The Conservation Branch has two principal functions. The first is to make surveys and investigations of the water and mineral resources of the public domain and to apply the results to public-land administration. The second is to supervise operations for the development of power and the production of minerals, including oil, gas, coal, potash, sodium, lead, and zinc, from public lands, Indian lands, and naval petroleum reserves. Additional funds, made available to the Conservation Branch during the year, provided extra assistance and equipment necessary for initiating war-related field investigations and the preparation of reports dealing with power and fuels and with minerals essential to the national war program. This activity, if maintained on the present scale, will reveal new reserves of such resources and will provide engineering information that is essential to the elimination of waste.

THE SOLIDS FUEL ADMINISTRATION FOR WAR

Our work in the Solid Fuels Administration for War helped to strengthen the coal industry for this emergency, but no legislation has been designed specifically to help us to stabilize the industry after victory.

We so regulated the distribution of coal that war industries, first of all, might receive their necessary supplies, and, after them, other consumers were taken care of according to their relative needs. This helped to stabilize war manufacture in coal-burning plants, and to facilitate the operations of railroads and public utilities.

By establishing relative needs for other than production use, and by regulating distribution accordingly, we forestalled widespread suffering among householders.

The distribution of coal was so arranged that we developed and put into effect over-all distribution programs which fully related the anticipated supply to estimated requirements, and the programs were

designed to assure an equitable distribution of all of the coal which can be produced under present conditions.

We helped to maintain maximum production at the mines, striving to retain mine manpower and to increase working hours and the number of days of work in the pits. We helped to furnish additional machinery and equipment and in the development and extension of mines.

All of these measures were carried out with the cooperation of the coal industry and of coal consumers.

The SFAW encountered a coal supply crisis only a few days after its establishment, when the first in a series of widespread mine strikes occurred. These strikes cost an estimated 40,000,000 tons of potential production in 1943. Thereafter, through 1943 and into early 1944, we dealt with a series of major and minor crises caused by coal shortages. While meeting the demands of the day, we enlarged the SFAW staff, formed advisory committees of experienced leaders of the coal industry, and began the development of long-range plans to avert further difficulties.

The programs that are now in effect cover coal distribution from the mine to the industrial plant and to the household consumer, and take into account differences in grades, kinds, and sizes of coal and the varying requirements of consumers. These programs will continue, subject to any modifications which changes in the coal supply may dictate, until March 31, 1945. Then they may be extended if necessary. They allocate scarce hard and soft coals among users in accordance with their needs and essentiality, encourage the use of alternative coals, where available, and spread the supply by limiting the amounts of the scarce coals that domestic consumers may receive. This will necessitate the extensive use of alternative fuels by such consumers and the practice of rigid conservation.

The SFAW was given the added responsibility during the year of distributing equitably the limited supply of coke available for domestic consumption.

A Nation-wide network of industry committees has been established to keep the SFAW informed of conditions in retail distribution and supply in order to avert local emergencies. If unavoidable crises occur, the committees will function to pool the resources of their communities, thus mitigating the distress of individual consumers.

The major production problem has been a growing shortage of manpower in the mines. This has placed a definite limit upon the productive capacity of the Nation's mines. Operators and miners have performed a difficult task in producing coal in spite of handicaps.

Much of the increased production has been in the strip-mined coal from temporary operations, and in low-grade coals which are suitable only for certain industrial uses. However, industrial consumers who are able to utilize these coals have been required to accept them so far

as possible, thus freeing the scarcer coals for use by industries which cannot shift, and for the use of domestic consumers.

Consumption of coal, in view of the production losses during the strikes and the impossibility of increasing production because of manpower shortages, would have been severely curtailed in the fiscal year except for the millions of tons of bituminous coal in consumer storage piles. This supply was accumulated in 1941 and 1942 against apparent emergencies. By compelling users with adequate stocks to draw upon them for part of their current consumption, the SFAW freed large tonnages of newly mined coal for the use of industries with insufficient stock piles and for distribution by retail dealers.

With the production lag in some coals that are most essential to industry and to domestic users, it is evident that the Nation's coal problems are not solved. Nevertheless, a smooth-functioning mechanism now exists to lessen the impact of difficulties and to facilitate the flow of coal for essential uses.

THE COAL MINES ADMINISTRATION

As a result of our work in the Coal Mines Administration the strike-bound coal industry was brought back to full production without our resorting to force. Before the end of the year we were able to return to private possession and control all except two of the Nation's anthracite and bituminous coal mines of which we took possession under your orders when the industry was paralyzed by strikes.

By the time the mines were returned, harmony had been restored between management and labor, firm wage contracts were in effect, bituminous coal production had increased to the largest volume it has ever reached, and anthracite output was at its wartime peak.

Under a Government-mine-workers' contract, which provided for no increase in the basic rate of pay specified in the miners' pre-war contracts with the operators, but which called for substantially increased working time, the men improved their efforts to augment coal output.

This contract served as the model for the operators and miners who, as a result of our intercession, were brought together by mutually acceptable wage contracts within the terms of the national stabilization program.

For years the industry has failed to operate in the absence of a contract between its owners and employees. As rapidly as the new industry contracts were effectuated, we began to return the mines to their private owners, and by June 21, 1944, all of the mining properties had been returned, except the two mines of one bituminous coal company which was engaged in a legal test of the portal-to-portal compensation which was provided for under the industry-mine-workers' agreement.

The Government first took possession of the mines on May 1, 1943. All of the mines that were involved were returned to their owners by

October 12, 1943. On November 1, 1943, possession was taken for the second time.

During the 13 months that the mines were in the possession of the Government, production per man was the highest on record, and the mine fatality rate from November 1943 through May 1944, was the lowest for any comparable period in our mining industry.

We organized the Coal Mines Administration early in July 1943, to administer Government possession of the mines. Its personnel was kept at a minimum by utilizing, in large measure, the trained workers in existing Bureaus of the Department of the Interior. The Coal Mines Administration, having done its work, is now being liquidated.

THE GENERAL LAND OFFICE

In the General Land Office we have worked as hard to fit ourselves for the best post-war land administration as we have worked to make our great contributions to the war program.

One of our big post-war jobs will be the administration of a carefully developed system of stabilized-land settlement in Alaska. Settlement in the Territory has a strong appeal, particularly to those vigorous and adventurous citizens who seek the opportunity to pioneer. We must do our utmost to foster that undertaking, for through such a spirit America has grown great. It is equally essential that the disastrous ghost-town experiences of earlier settler days on the mainland be avoided in the development of Alaska. Plans already laid by the General Land Office for the attainment of that objective can be facilitated by congressional authority to extend to Alaska the requirement that public land, before disposal, must be classified as suited to the use for which it is sought.

Land settlement in the United States by returned service men constitutes another high priority problem. We could assist greatly in its solution by the establishment and maintenance of an inventory of all Federal lands, in order that a fresh determination may be made of the locations of the comparatively few tracts on the public domain which may still be suitable for homesteading.

Increasingly mechanized armies require greater amounts of minerals for war and call for the highest degree of efficacy in our national mineral economy. But we cannot achieve that efficiency without a rejuvenation of our Federal mining laws. Vast areas of public lands, and lands acquired under many Federal laws, constitute a storehouse of essential minerals, yet, under present statutes, no method exists by which the United States may catalog and, in cooperation with private initiative, develop the resources on those lands through leases based on sound principles of conservation. Legislation that would provide for the marshalling our full complement of mineral resources is a necessary adjunct to adequate stockpiling.

The soundness of this Administration's conservation policies was clearly demonstrated by the accomplishments of the General Land Office in the administration of the public domain during the past fiscal period. Although a full realization of the program for maximum benefits to the people from the use of natural resources, particularly minerals, was blocked by opposition to a much-needed revision of the Federal mining laws, there were other distinct gains registered during the year. For example, operations for the 12-month period were featured by the highest bid ever received by the Government for the privilege of drilling for oil on a single acre of Federal land, when \$26,216.21 per acre were offered as a bonus for leased land in the Elk Basin field in Wyoming. Moreover, the cash receipts from the activities of the office were the largest in 20 years, exceeding expenditures for its maintenance at a ratio of \$6.18 to \$1, and producing a total cash return of more than \$14,000,000.

In addition to furnishing minerals for war through the administration of the mining and mineral leasing laws, the office made a greater aggregate contribution of public land and resources for war uses than ever before. More than 15,400,000 acres of the public domain have been made available for training areas, target ranges, and other military uses during the emergency period, and approximately 70,000,000 other acres were set aside to permit the exploration and development of minerals for war. Timber for war uses was furnished from the re-vested Oregon and California railroad grant lands under its jurisdiction. Stability for industries and communities in that region will result from the wider establishment, contemplated for the near future, of economic units for sustained yield forestry operations.

THE OFFICE OF LAND UTILIZATION

In the Office of Land Utilization we placed special emphasis on plans for extending our land conservation and development programs after the war to furnish interim employment, if needed, during the demobilization and reconversion period.

A major forward step in administrative management was taken by the establishment of a Water Resources Committee in the Office of the Secretary, to assemble and disseminate essential information concerning water-development programs involving the Department; to review water-development projects proposed by the bureaus and offices of the Department; and to formulate such recommendations as will assure an all-inclusive departmental water conservation policy.

Although continuing to operate on reduced wartime budgets, the land-conservation programs which are coordinated by this office made satisfactory progress in the protection of resources and of strategic facilities on the public domain during the fiscal year. Forest and range fires were held to low levels. Excellent cooperation on the part

of range users increased the effectiveness of soil and moisture operations. The 11 conscientious objectors' camps operated by the Department continued to give first priority to conservation programs, including fire, insect, and disease control.

THE GRAZING SERVICE

Our post-war plans in the Grazing Service provide for the employment, on a 3-year basis, of 31,000 men on 60,000 projects of 16 major types, including soil, water, and forage improvements, in 200 western counties. This work would aid in the restoration and better use of the Federal range, and would condition these long-neglected lands to contribute their fair share to the local and national economy. Such projects would increase production on the range, and would protect the water and the soil on the public and other lands.

Although primarily concerned with the administration, protection, and development of the grazing and related resources on the 142,000,000 acres of Federal range in the 60 grazing districts in 10 western States, the work of the Grazing Service during the year just closed included many other activities relating to the war and after-war period.

The Grazing Service made available 14,428,919 acres of public land for maneuvers, precision bombing, gunnery ranges, training camps, airfields, and other military purposes. Grazing privileges were issued to 22,562 livestock producers for 10,694,305 head of livestock. Alternating military and grazing uses in large areas enabled range lands to serve two war uses.

Extensive range improvements were postponed to conserve manpower and materials. Access roads of 788 miles were constructed, making a total of 1,570 miles in 2 years to tap 20 types of critical materials in 8 States.

THE FISH AND WILDLIFE SERVICE

Changes in administrative objectives and procedures necessitated by wartime economy surely will carry over into our post-war activities in the Fish and Wildlife Service. It has been necessary, for instance, to give rather close attention to labor problems in the fishery industries. As a result of the benefits obtained, it is planned to establish a labor unit, the operations of which will contribute to the solution of post-war problems in employment and social security.

Methods have changed through an increased adoption of scientific management principles in fish production, whether in the farm ponds that are now being built by the thousands, in the lakes and streams providing important recreational angling, or in the bays and seas which are the source of the greatest commercial yield of fishery products.

A 3-year development program in fish and wildlife conservation is ready to be put into action whenever required. This program will provide employment for thousands of persons and will benefit numerous industries which manufacture the supplies that will be needed.

A record take of fur seals brought returns expected to exceed \$4,500,000, and economic uses of the wildlife refuges yielded an income of \$244,700.

The Fish and Wildlife Service has put boats and buildings to war use, its refuge lands are used on a vast scale for military training and for actual fighting bases, and its personnel cooperates in observing enemy submarines and in guarding against sabotage and subversion.

THE OFFICE OF COORDINATOR OF FISHERIES

We have brought about the accomplishment, to an encouraging degree, of the primary tasks which we undertook in the Office of the Coordinator of Fisheries. This applies to the Nation's war and post-war needs.

With the demand for fishery products greatly increased by the war program, the most essential need was to halt the decline in production which set in early in 1942, and, if possible, to restore the yield to the pre-war level. Through the unceasing and closely coordinated efforts of industry and Government, this aim is now being accomplished. The total yield of fishery products in 1943 was slightly more than 4,000,000,000 pounds, a substantial increase over the 3,700,000,000 pounds landed in 1942, and approximately equivalent to the catch in 1940. While the yield in 1944 cannot be foreseen with accuracy at this point—June 30, 1944—the upward trend appears to be continuing and a total production of approximately 4,300,000,000 pounds is anticipated.

The restoration to the fishing industry of the greater part of its machinery of production is largely responsible for this improvement.

The requisitioning of 700 of the finest fishing boats for the Army and Navy caused a loss in productive capacity amounting to 50 percent or even more in certain fisheries. Restoration of the depleted fleet is proceeding rapidly. Total returns of requisitioned craft now amount to approximately 40 percent of those originally taken; while authorizations for the construction of new vessels totaled 1,010 by June 30. Of these, 661 were scheduled for completion by the middle of 1944. When construction of the authorized craft has been completed the fishing fleet will have regained its full strength and will consist of a larger proportion of new vessels than ever before. Similarly, the situation with respect to the repair and maintenance of vessels and shore plants shows further improvement over last year, while the gear situation is generally satisfactory.

Not all of the wartime problems of the fishing industry have been solved. There are not enough men to operate the vessels, the shortage of captains, mates, and other skilled personnel being especially serious. Labor is critically scarce in many processing plants. Operating programs administered by the coordinator's office are still required in the salmon and pilchard fisheries to obtain the maximum production and the most efficient utilization of the catch. Difficulties of refrigerating, storing, and transporting the products of the fisheries have not yet been satisfactorily resolved.

One of the most significant and gratifying facts, however, is the sound condition of the fishery resource. Because the precepts of wise conservation have been followed even while attempts were being made to increase production, many important commercial species are actually showing signs of an increase in abundance. Instead of being impaired by the heavy demands of war, the fisheries will be in excellent condition for post-war development.

THE NATIONAL PARK SERVICE

In the National Park Service we have contributed toward the Nation's post-war future by holding intact those priceless remnants of the American scene entrusted to our guardianship. Despite the issuance of more than 1,000 authorizations to war agencies for the use of park lands and facilities, there has been but little impairment of park features. They would have been impaired if we had yielded to organized group pressures, without questioning the alleged critical necessity for invading the parks, or if we had not helped to explore alternative courses of action, when the use of resources in the parks was proposed. Credit is due to the representatives of war agencies, military and otherwise, who have realized the value to the Nation of preserving the national parks unimpaired.

The National Park Service during the past year has been subjected to some unwarranted and unjust criticisms by interests that have seen in the war an opportunity to utilize, for their own gain, certain natural resources hitherto denied them because of well-established park policies. These resources include representative areas of virgin forest, the forage available for cattle and sheep in the meadows, water resources, and minerals. Although these do not bulk large in the total economic life of the Nation—the acreage of the Park System is only three-fourths of 1 percent of the land area of the United States—groups that stand to gain thereby have tried to reopen old issues as to exploitation of the parks under the pretext of war needs. These interests represent small, but vociferous, minorities.

Despite a country-wide campaign of misrepresentation, against designating the Jackson Hole as a national monument, I am convinced that the persons who have directed this campaign do not represent

public opinion nationally or in the region concerned. There recently was published in the Congressional Record, by the chairman of the Public Lands Committee of the House of Representatives, a petition signed by more than 100 leading citizens and business people of the Jackson Hole region, asking that this area, rich in scenery, wildlife, and historical interest, be preserved for park and recreational purposes, rather than allow it to go the way of unplanned exploitation.

Although we have stood ready to sacrifice the park spruce for Army aircraft construction, if absolutely necessary, the need was met without destroying the magnificent "rain forests" of Olympic National Park in the State of Washington. It has not been necessary, either, to open the national parks of California to cattle grazing. The situation that confronted the cattle industry in the State during the drought was serious, but the use of the meadows and uplands of the parks in the Sierra Nevada for grazing would have accommodated fewer than one-half of 1 percent of California's approximately 1,400,000 beef cattle, and that only for a brief period. This inconsiderable aid would have been out of proportion to the resultant damage to public properties.

Two important areas were added to the National Park System during the year—the 700,000-acre Big Bend National Park on the Rio Grande in Texas, through the donation of lands by that State, and the home of Franklin D. Roosevelt national historic site.

Since the attack on Pearl Harbor, 4,135,000 men and women in uniform have visited the national parks and allied areas, including scenes of important events in the Nation's history, and, as a result, they have the better appreciated the greatness of America.

THE OFFICE OF INDIAN AFFAIRS

The progress in the Office of Indian Affairs has been better than could have been expected considering the innumerable hampering restrictions that are placed upon our administrative procedures. Administration will be good, in my opinion, to the extent that a competent administrator is left free, within reasonable limits, to apply his energies and his funds as shifts of circumstance require. But the Indian Office is restricted to an uncommon degree in its activities and in the exercise of the Commissioner's judgment by means of limitations which are written into its appropriation bill.

The budget for this office is broken down into about 200 separate appropriations, each hedged with limitations—so much for salary to an Indian school superintendent, for instance, so much for his assistant, so much for drayage, so much for repairs, etc., and no matter how little money may be needed for these items nor how much may be required for a purpose that was unforeseeable when the budget was submitted, funds may not be used to defray any expenses for which they were not specifically appropriated. There is a specific appro-

priation for each of our many Indian boarding schools and unforeseeable circumstances may cut the cost of conducting these and increase the cost of conducting another, still we are prohibited by legislation from diverting more than 10 percent of an appropriation from one school to another.

Some of the restrictions strike at the very base of our fundamental policies—for example, bills to issue patents in fee and to remove restrictions on the sale of specific tracts of Indian lands. The enactment of such measures has the effect of removing our authority to protect the Indians' interests in the sale of their lands. Such bills are introduced ordinarily after the Office of Indian Affairs has determined that a proposed sale would not be in the best interest of the Indian who proposes to sell. More than 20 such bills were introduced before the Seventy-eighth Congress. Despite such limitations on restrictions the Office of Indian Affairs has accomplished much during the fiscal year.

Indians, in cooperation with field employees of the Office of Indian Affairs, began work on proposals for post-war programs to meet the needs of various reservations. Sixty-four detailed proposals dealing with the problems of 120 tribes, have been submitted, and these are being carefully analyzed. When approved in their final form they will point the way to economic self-sufficiency and integration into the national life.

Increased interest in education on the part of Indians was evidenced, and a number of tribal councils passed compulsory education ordinances and enforced others that had been neglected. Indian communities have taken an active part in planning school programs. Many throughout the country have requested that Indian Service schools be equipped for the training of home-coming soldiers who may wish to take advantage of the opportunities that are offered by the Servicemen's Readjustment Act. Plans are being made to meet these requests.

The contribution of Indians to the prosecution of the war has been most remarkable. On the first of April, 21,756 had joined the armed forces and were serving with conspicuous gallantry on all fronts. Indians have won all decorations, including the Congressional Medal of Honor and the Croix de Guerre.

Approximately 15,000 Indians are regularly employed in war industries, and in addition, 10,000 men, women, and children have left their homes for varying periods to work on farms and ranches.

Notwithstanding the great exodus from reservations, the total value of all Indian agricultural products last year was more than \$15,000,000, nearly \$2,000,000 more than in the fiscal year 1943. The production of food by the Indian schools was 50 percent greater than in the fiscal year. Fifty-eight thousand gallons of fruits and vegetables were

canned and 10 tons were dehydrated. In addition, 17,000 tons of stock feed were raised.

At the end of the year Indians owned 1,500,000 head of livestock—90,000 more than they owned in the fiscal year 1943.

It is estimated that war bond sales to Indians had reached a total of \$50,000,000 by the end of June.

The rebuilding of the Indian landed estate has continued, and approximately 700,000 acres were added within the United States proper. In Alaska, 6 new reservations, with a total of approximately 13,000 acres, were established, and proposals for 16 additional reserves, comprising nearly 4,000,000 acres, are under consideration.

The democratic approach to the solution of Indian problems has been emphasized during the year. On a number of reservations Indians have organized health councils for the purpose of combating communicable diseases, and these organizations are functioning with enthusiasm for the task. Further progress was made in solving the difficult problems of fractionated land ownership through inheritance. The Rosebud Tribal Land Enterprise is the latest organization to attack the problem.

Indian arts and crafts have not languished, despite the fact that many young craftsmen have left home. In many cases there has been an increase in production and sales, owing to the sponsorship of co-operative producing and distributing centers. Plans have been made for an expansion of craft activities after the war.

THE DIVISION OF TERRITORIES AND ISLAND POSSESSIONS

In the Division of Territories and Island Possessions we have been occupied with the economic and social adjustments in our offshore areas which are becoming more pressing as the end of the war approaches.

The key positions held by Alaska, Hawaii, and Puerto Rico in international travel and as way stations between the world's greatest production centers and the world's greatest markets have brought them into sharp focus and emphasized the urgency for preparing them for their post-war roles.

Owing to progressive reductions in its appropriations for personnel, however, the Division has been seriously hampered in trying to perform its duties effectively. If the Department is to be charged with responsibility for the territories we must be provided with funds that will be adequate for the purpose.

The importance of Alaska is universally recognized. Hundreds of letters from service men, indicating their interest in establishing themselves in Alaska after the war, have dramatized the need for a

well-integrated program of settlement. The Territory remained a "combat area" throughout the year, although the last Japanese were ejected last summer. Health and welfare problems that have been aggravated by war conditions continued to be serious. The Division has worked and will continue to work closely with other bureaus and Departments on these problems and on development programs for the Territory.

The Alaska Railroad for the second successive year has exceeded all previous records in its volume of freight and in passenger traffic. The manpower shortage has presented an acute problem, but despite this handicap, the railroad has continued its improvement program. To meet wartime demands much additional equipment and rolling stock were purchased, most of which was second-hand, due to immediate necessity which would not permit delays incident to the securing of new equipment.

The relaxation of military rule in Hawaii has been an important factor in relieving tension. Many conferences were held with the War Department looking to the termination of martial law, while maintaining such restrictions on civilian activities as may be necessary in view of the importance of Hawaii as an offensive base. Civilian shipping requirements, housing, and public health have had the attention of the Division.

Political advances in territorial areas should keep pace with the aspirations of the territorial people and with their skill in political self-management. During the past year, the concerted desire of the people of Puerto Rico for greater home-rule, expressed there by groups of every political shade, found response in your declaration that the Organic Act of Puerto Rico should be revised so that it would include the right of the people to elect their own governor, and in your appointment of four able and distinguished Puerto Ricans and four continentals, of whom I had the honor to be one, to draft recommendations for such action. The people of the island have the skill and ability to manage their local affairs. I believe that the enactment into law of the recommendations made by the advisory committee which you appointed would give substance to this Nation's declared policies, and that the Puerto Rican people would use this law to strengthen democratic self-government.

At the same time there has been in the island an upsurge of hope and an energetic striving among these people to cure the severe economic dislocations. Some parts of the program which they are executing may not work. They may find it necessary to discard certain features. This must certainly be a period of trial and error, but I believe that there will develop a measure of economic improvement which will at least give the masses of people some hope of a better standard of living.

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An increase of approximately 178 percent in income taxes in the Virgin Islands materially improved the condition of the municipalities' treasuries. The Selective Service and Training Act of 1940 was applied for the first time to the Virgin Islands, and at the close of the fiscal year there were 3,660 registrants between the ages of 18 and 44 in St. Thomas and St. Croix. The Islands were handicapped by the elimination of the Federal appropriation for the position of Government Secretary. This, combined with the frequent absences of the Governor, whose duties by law devolve upon the Government Secretary, threw a very heavy burden on the small administrative staff.

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program for returning the loyal and law-abiding majority of evacuees to the mainstream of American life.

At the close of the fiscal year, 18,672 persons who are not suitable for resettlement were residing in the Tule Lake segregation center in northern California. Segregation, however, had not proved satisfactory as a permanent measure. Among the segregants were approximately 3,300 children under 17 years of age and an additional 1,800 persons who were placed in the center solely to avoid disrupting family units. Careful studies of the segregants indicate that only a few of them are disloyal to the United States. Many older people sought to be segregated simply because segregation seemed to offer them a haven for the duration of the war. Others went to the center in protest against the evacuation and the restrictions that were placed upon them. They interpreted these restrictions as evidence of unfair discrimination. It is extremely doubtful that deportation after the war will dispose of the Tule Lake problem.

The conversion of Tule Lake into a segregation center left nine centers populated principally by individuals and families that are eligible for relocation. At the end of the year the progress of relocation had enabled us to close one of them—the Jerome center in southeastern Arkansas. A total of 16,846 persons departed from the centers on indefinite leave during the 12-month period, making a grand total of 23,693 to that date. Mainly, they were younger people without family responsibilities, though an encouraging increase in the relocation of older people and family groups occurred toward the end of the year.

The relocation of those who remain in the centers becomes more difficult as the younger people leave. Every departure increases the percentage among the residue of evacuees who, because of age, infirmities, unfamiliarity with English, and indigency, are less amenable to rehabilitation in strange environments. Many evacuees have developed a reluctance to leave the comparative security of the centers for the uncertainties of life outside. This reluctance is hard to combat, but we are working constantly to overcome it.

The departure of the younger, more able-bodied evacuees also has augmented the difficulty of recruiting evacuee-workers to maintain essential services at the centers. No essential service has been allowed to lapse, however, and no phase of the relocation program has been abated to hold workers in the centers. The full force of the War Relocation Authority has been exerted to relocate the evacuees as rapidly as possible.

On June 9, the War Relocation Authority was assigned to take charge of an emergency shelter that was to be established at Fort Ontario, N. Y., for approximately 1,000 European war refugees. Plans to receive the refugees were under way at the end of the fiscal year.

THE SOLICITOR'S OFFICE

Through the concerted work of the Solicitor's Office and the legal divisions of the bureaus and offices under the supervision of the Solicitor, the attorneys of the Department have done much during the past year to advance the Department's post-war programs, to support the fighting of the war, and to protect and conserve the Nation's resources for their best long-term use.

Since most of the Department's post-war programs require legislative authority, the Solicitor's Office and the legal divisions of the interested bureaus proceeded to put these programs into legislative form. Some of the bills were enacted. The most important legislative proposals provided for the opening up of greater homestead and industrial opportunities to veterans and other persons in the territories and in the continental United States through reclamation and power developments. Another important bill, prepared in anticipation of post-war liquidation problems, provided for the administration of surplus Federally owned real property.

Toward the winning of the war the attorneys of the Department originated the legal mechanisms for the equitable and beneficial allocation of supplies of coal and other solid fuels and of fishery resources. They prepared the necessary documents for the operation of the coal mines and for the termination of Government possession, undertaking extensive research to protect the Government. They drafted regulations for the storing, handling, and transporting of explosives and their ingredients by civilians, and for the operation of relocation camps for citizens and aliens of Japanese ancestry and for other persons who had been removed from military areas. They reviewed leases, permits, and other agreements whereby agricultural, grazing, timber, and mineral resources of the Nation were made available for military uses or for the greater production of food and other necessities of war. They gave attention to the legal problems that were involved in the application, under martial law, of military orders to civilians in Hawaii, and engaged in numerous conferences on such problems with the War Department and the Department of Justice. They also drafted contracts for the operation of experimental metallurgic laboratories.

In the field of a long-term conservation of resources, the attorneys helped to prepare Public Law 273, establishing the principle of sustained-yield to forest management on Federal lands, and Public Law 106, strengthening the Alaska game and fish protection law. They protected title to certain public lands that were subjected to invalid claims and passed upon the title to new acquisitions of grazing, timber, and park lands. They maintained Indian property rights on the Pyramid Lake and Allegheny Reservations through successful litigation and undertook the protection of Indian lands in Alaska through the

study of Indian land claims. They also devoted increased energy to the protection of the civil rights of various groups toward which the Federal Government has assumed special responsibilities, notably the inhabitants of Hawaii, Puerto Rico, and other Territories and possessions, as well as Indians and evacuees of Japanese descent.

To stimulate the interest of the Department's attorneys in the opportunities of Government service and in the possibilities for improvement in standards of work, the Solicitor put into effect a strict application of the Department's advancement from within policy and undertook the establishment of an in-service training program.

CONCLUSION

From all of the foregoing I conclude that we have so far advanced conservation that nearly every individual on this continent may improve his lot if only we have the will to make our gains serve their logical purpose—the advancement of human welfare. The consolidation within a brief time of gains that have been long in the making, is not new in our history. Steam propulsion spent a century in the toy and novelty stage, then developed enough in a decade to reshuffle our industrial processes. Electricity followed the same course to the point at which it revolutionized domestic economy. So did automotive transportation. The advent of hydroelectricity, so developed that it can revolutionize heavy industry, and accompanied by equally developed supporting facilities, serves mainly to introduce a new generation to an historic occurrence.

There are some differences, of course. One difference appears especially important to me. All of the other great additions to the world's power have reached the world-changing stage under divided ownership. Public will, no matter how united, could not have demanded the prompt development and the equitable use of the potential power in steam or in the internal combustion engine. The development of potential power usually has been delayed while individuals have warred over who should profit when the development occurred. The consumers eventually financed such wars.

The final results of conservation that I have referred to as power—the product of our dams, our irrigation projects and other developments—is the first great accumulation of new energy that ever belonged to all of us. In that there is a huge advantage and a corresponding responsibility. The advantage is that we can put our new acquisition of power to work for all of us, and do it promptly. The responsibility is that we must do these things for ourselves.

Sincerely yours,

Harold L. Ickes

Secretary of the Interior.

Bureau of Reclamation

HARRY W BASHORE, Commissioner¹



PREPARATION to safeguard the western economy in the critical postwar transition period was emphasized in activities of the Bureau of Reclamation in the fiscal year 1944.

Reclamation developments have greatly increased food and power production for war, but today the Bureau is making ready to enable the people to utilize western water and land resources in a great peacetime expansion. Plans call for completion of irrigation and multiple-purpose projects now authorized, involving costs of more than three-quarters of a billion dollars, and for construction of 236 potential projects. These were described in an inventory placed before the Senate Committee on Postwar Economic Policy and Planning on June 6, 1944.

This presentation emphasized the fact that authority for projects which would not be entirely self-liquidating would have to stem from Congress, and that funds also would have to be voted before detailed plans could be completed.

In anticipation of approaching industrial reconversion, the Bureau is getting ready for quick employment of hundreds of thousands of demobilized servicemen and civilian war workers. Equally important is the objective of permanent homes for veterans and others on irrigated farms in 17 Western States—homes which will assure large new markets for products of eastern as well as western farms, and for factories in all parts of the Nation—a true expansion of our western frontier.

Planning was carried forward simultaneously with Bureau activities to increase food production and hydroelectric output to drive the wheels of a war industry which sprang up with incredible rapid-

¹ Mr. Bashore took office as Commissioner of Reclamation on August 3, 1943, having been appointed by President Roosevelt. From May 27, 1939, until his appointment, he had been Assistant Commissioner of Reclamation. William E. Warne, formerly Chief of Information of the Bureau, was appointed Assistant Commissioner by the Secretary of the Interior on August 3, 1943, and entered on his duties on August 9.

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ity to pour forth aluminum, airplanes, warships, ammunition, which without this power would have limped. Throughout the planning, there was intense awareness of the difficulties all will face—particularly the West—in making the adjustment to peace.

But as a result of this foresight, it will be possible to put the demobilized men at project sites in the Western States almost as soon as peace comes, provided enabling legislation is passed; and the benefits will spread to industries and transportation systems in the 31 States as soon as orders are placed for equipment and supplies. It will be needed in the construction of the Bureau's projects and in the creation of farms that will be established upon them.

For the discharged men who are qualified by previous training and experience to undertake irrigated farming, 135,000 new farms will be made available. In the wake of the new development would rise new cities and towns, having a population equal to that of the rural areas. Markets and production centers throughout the Nation would be stimulated by the enlarged western purchasing power.

Toward the integration of western industry and agriculture, the program must be developed together if the region is to reach full economic maturity, the multiple-purpose projects in the program would furnish large blocks of new low-cost electric power. Revenues from the sale of the new energy would pay for a sizable portion of the project construction costs which have been estimated, on the basis of 1940 prices, at nearly 3 billion dollars.

Reclamation construction is ideal as a postwar undertaking because the volume and speed of the construction can be readily geared to the volume of employment and settlement needs. And what is also important, the development and utilization of unused water supplies for the production of hydroelectric power and expansion of irrigation will permanently enrich the West.

Continued study of the land and water resources of the West during times of peace and throughout the war, have made it possible for the Bureau to present its concrete postwar blueprint. From the beginning of the war, it has advanced, as rapidly as emergency conditions permitted, investigations of more than 200 individual projects and of approximately 70 river basins and subbasins.

The Bureau made notable progress in advancing postwar planning the year without relaxing its war activities in the fields of power and food production. Outstanding records were made in both.

Reclamation generators delivered nearly 14½ billion kilowatt-hours of electric power, about 52 percent more than in the preceding fiscal year. The increase since the fiscal year ending a few months before Pearl Harbor is 400 percent. More than 90 percent of the new power made available during war was consumed by war industries.

aluminum and magnesium plants, airplane factories, shipyards, and munitions plants. The 3-year increase in production was about five or six times the percentage of increase in aggregate production recorded over the same period by all plants in the United States.

The expansion in output resulted from a highly accelerated program of hydro power installations. During the war a million and a third kilowatts of new installed capacity were added—about half a million this year—to bring the Reclamation installation to about 2,360,000 kilowatts. The Bureau's war power contribution constitutes 84 percent of the total new capacity made available in the 11 Far Western States since 1941.

No less spectacular were the achievements of farmers on Bureau projects in production of vital war food crops. The more than 4 million acres served in 15 Western States during the calendar year of 1943 produced 52 percent more potatoes than in 1942 and 23 percent more beans. The expansion in these basic food crops is indicative of the manner in which Reclamation helped forestall threatening food shortages.

Throughout the fiscal year the Bureau, in recognition of the great need for increased agricultural production, sought to construct new facilities to bring under cultivation additional areas of arid and semi-arid lands and to provide supplemental water for farms on which crop production was being reduced by an inadequate supply of water. Since the fall of 1942, when the Bureau's ability to expand irrigation was limited by diversion of critical materials to other war uses, it has requested the War Production Board to clear many projects on which food production could be expanded. On June 30, 1944, this agency, on recommendation of the War Food Administration, had approved construction of projects on which irrigation service is being extended to 1,265,782 acres.

Another significant Reclamation wartime service was the provision of municipal and industrial water to major war plants and cities and towns which were important in war activity. Municipal areas of 3 million population, including Los Angeles, depend on Bureau projects for supplemental supplies.

PEACETIME CONSERVATION PAYS WAR DIVIDEND

The wartime benefits of Federal Reclamation are the result of 42 years of activity by the Bureau of Reclamation in the field of land and water conservation in the West.

Under the Reclamation Act of 1902, the Bureau has put into operation, or has under construction or authorized, in the 17 States west of or bisected by the 100th Meridian, 78 irrigation and multiple-purpose projects. Fifty-two of these are producing food supplies, electric

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But as a result of this foresight, it will be possible to put to work demobilized men at project sites in the Western States almost as soon as peace comes, provided enabling legislation is passed; and the benefits will spread to industries and transportation systems in the other 31 States as soon as orders are placed for equipment and supplies that will be needed in the construction of the Bureau's projects and in the creation of farms that will be established upon them.

For the discharged men who are qualified by previous training and experience to undertake irrigated farming, 135,000 new farms ultimately would be made available. In the wake of the new development would rise new cities and towns, having a population equal to that of the rural areas. Markets and production centers throughout the Nation would be stimulated by the enlarged western purchasing power.

Toward the integration of western industry and agriculture, which must be developed together if the region is to reach full economic maturity, the multiple-purpose projects in the program would offer large blocks of new low-cost electric power. Revenues from the sale of the new energy would pay for a sizable portion of the project construction costs which have been estimated, on the basis of 1940 prices, at nearly 3 billion dollars.

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energy, and furnishing municipal-industrial water. On several operating projects important features remain to be completed. On 9 projects that have been authorized, work has been deferred because of the war.

In the area to which the Bureau's activities are confined the rainfall is inadequate to support agriculture, and conservation of water for irrigation is essential for the maintenance of civilization. The need for low-cost power for irrigation pumping, industries, and other uses has given added emphasis to the importance of double and triple use of limited water resources. The Reclamation developments also provide, in addition to benefits mentioned earlier, flood control, river regulation, repulsion of salt water encroachment and reduction of clogging silt deposits. They aid fish propagation, and create recreational areas and waterfowl and wildlife refuges.

Nearly 5 million persons live in areas in which Bureau of Reclamation systems are operated. About 3½ million persons benefit from power and domestic water, and 1,257,395 live on the 91,120 farms or in cities and towns on Federal irrigation projects. These developments support 338 towns, 1,207 schools, 1,514 churches, and 137 banks (with deposits totaling half a billion dollars) (see table 3). When the construction program now authorized is completed, the various Bureau services will be extended to areas in which reside more than 10 million persons.

The Federal investment in Reclamation developments at the end of the year totaled \$930,000,000. (See table 5, p. 34.) More than 95 percent of the cost is reimbursable under Reclamation law. The remaining 5 percent is allocated to flood control, aid to navigation, and non-reimbursable labor costs.

POSTWAR INVENTORY COMPLETED

Mindful of the Secretary's words—"in time of war we must prepare for peace"—the Bureau laid a sizable portion of the foundation for a stabilized peacetime western economy, warped out of proportion by the dislocations of war.

Near the end of the fiscal year, it completed for the Senate Committee on Postwar Economic Policy and Planning an inventory of irrigation and multiple-purpose projects in the West, which could be included in a postwar public works program to provide employment for discharged veterans and war workers, and make available to those who are qualified, livelihoods on irrigated farms.

In the program are 40 projects already authorized for construction, and about 200 under study. On many of the projects authorized, work is in progress to advance the Bureau's war food and war power programs. Construction on others has been halted or deferred because of the war.

Carried out in full, the contemplated program would furnish employment equivalent to $1\frac{1}{4}$ million men working 1 year, and create an estimated 135,000 new farms. In addition, it would bring greater security to 150,000 additional families, now handicapped by inadequate water supplies which do not permit maximum crop production.

The need for postwar employment and settlement opportunities was indicated to the Bureau in a report by labor experts, which stated that $14\frac{1}{2}$ million persons will be demobilized from the armed forces and war plants. About 3 million of those who will face reemployment problems live in the 17 Western States, and, what is of prime importance to the irrigation program, some 265,000 of this number will be equipped by previous training and experience to undertake irrigated farming.

While the proposed construction would be centered in the western half of the country, 56 percent of the employment—the equivalent of 698,000 men working for a year—would be provided in the mines, mills, and factories of the Midwest, East, and South. The remaining 44 percent, or 553,000 men, would be employed at the sites of construction.

The effectiveness of the Reclamation construction as a shock absorber in the postwar reconversion is enhanced by the fact that it permits a "quick get-a-way". Provided with funds and manpower to complete field investigations and preconstruction work, the Bureau could put more than 300,000 men to work the first year. A peak employment of 400,000 could be reached in the second year.

From the long-term point of view, the inventory is an important milestone toward the expansion of western irrigated agriculture in which lies the basic hope of the region for increased growth and prosperity. The dry-land farming potentialities of the West are virtually exhausted, but water is available for the irrigation of 22 million additional acres of land, approximately the acreage now served. The projects in the inventory would extend irrigation service to a third of the new area—6,705,000 acres—and, in addition, furnish supplemental water for 9,364,000 acres now inadequately watered. Construction of irrigation features on authorized projects alone would create 70,000 new farms and overcome the water deficiency of 100,000 existing farms.

The growing need for added agricultural production in the West is known to all who have analyzed the western economy. The area is becoming increasingly deficient in crop production to meet its own requirements. Expansion in cultivated acreage has not kept pace with population increases. While the number of people living in the Far Western States has increased 60 percent from 1920 to 1940, the irrigated acreage has been expanded but 10 percent.

Integrated industrial and agricultural development is one of the basic prerequisites for orderly economic growth of the West. The same reservoirs which will serve irrigation could provide 1,765,000

kilowatts of new power for industrial use, if the Bureau increased its installations, and 2,579,000 kilowatts of firm power capacity on projects under study. Through revenues derived from the sale of this energy, projects not otherwise economically feasible, can be made sound.

The full development of the new farms and the new communities will increase the purchasing power of the West for products manufactured elsewhere by 1¼ billion dollars, at 1940 prices. The estimated construction cost of the projects in the inventory, on the basis of pre-war prices, is \$2,952,393,000. About \$793,000,000 would be required to construct irrigation features on projects already authorized. The construction of most of the 196 potential projects included in the list would require special legislation by Congress. The inventory may be changed as basin surveys are completed, with additional projects added or substitutions made for those now included.

WAR POWER EXPANSION SPECTACULAR

The greatest expansion of electric power generating facilities ever made by a single agency in a single year was the wartime record established by the Bureau of Reclamation in fiscal year 1944 to meet emergency industrial demands. More than half a million kilowatts of hydro power were added in 31 plants on Reclamation projects in 12 Western States. The increase surpassed by about 55,000 kilowatts the additions made during the previous fiscal year, and by about 100,000 kilowatts, the capacity added in fiscal year 1942.

The new facilities, whose output was almost wholly consumed by airplane factories, aluminum and magnesium plants, shipyards, and other industries that made fighting equipment, brings to nearly 1,400,000 kilowatts the capacity made available since July 1, 1941—a few months before Pearl Harbor. Additional installations proposed by the Bureau, aggregating 865,000 kilowatts, were halted by the War Production Board in the fall of 1942 to conserve critical materials for other war uses. The present Reclamation installation totals about 2,360,000 kilowatts. When all generators on existing projects and on those authorized are placed into operation the capacity will be 4,863,075 kilowatts.

The rapid enlargement of power facilities on Bureau projects was the result of farsighted construction, in time of peace, of multiple-purpose projects designed to meet current and potential industrial and agricultural requirements of the growing West. On these projects, stored water serves both irrigation and power generation.

The output of Reclamation generators paralleled the great gain in capacity. During the fiscal year the plants produced 14½ billion kilowatt hours, highest on record. This was an increase of more than 50 percent over the preceding period.

The new power developments during the fiscal year were confined to three projects. Early in the year the Bureau began transmitting power from Fort Peck Dam (Montana), constructed by the War Department. At Grand Coulee, three of the world's largest hydroelectric generators, each rated at more than 100,000 kilowatts, were put into operation. At the end of the fiscal period, two units, each of 75,000-kilowatt capacity, began service at Shasta Dam of the Central Valley project (California).

The immense blocks of Reclamation power made available in the West, particularly on the Pacific coast, have made possible its record-breaking increase of industrial production. Energy from Boulder Dam supplies the great aircraft plants in the Los Angeles area, the largest magnesium plant in the world near Boulder City, Nev., and other basic war industries, while power produced at Grand Coulee serves a half dozen large aluminum plants, the biggest carbide plant west of the Mississippi, large shipyards, and many other plants.

Gross revenues from the sale of electric power produced in plants operated by the Bureau reached an all-time high during the year of 1944, \$18,992,000. This was a \$4,438,000 increase over fiscal year 1943. Production of power, while regarded as incidental to the Bureau's major function—irrigation of arid and semiarid land—is highly important as a source of revenue for reimbursing the United States for the cost of Reclamation construction. Power will repay half the investment of the Reclamation program as outlined at the beginning of the war.

Boulder Dam's gross revenues are the largest of all Bureau plants. In its 7 years of operation, this development has returned to the United States Treasury \$25,200,000 in net revenues, and in addition, has paid the states of Arizona and Nevada, \$4,200,000, and the Colorado River development fund, through which potential projects in the Colorado River Basin are investigated, \$3,500,000.

Preparations for the sale and transmission to war industries of the output of two 75,000-kilowatt generators at Shasta Dam of the Central Valley project (California), were completed during the year. In September 1943, a wartime contract, guaranteeing the United States an annual payment of \$2,775,000 after January 1, 1945, was made with the Pacific Gas & Electric Co. The 97-mile Government transmission line over which the energy will be delivered to company facilities at Oroville was completed in July 1944.

RECLAMATION FOOD PRODUCTION AT NEW HIGH

Like their sons on the fighting fronts, reclamation farmers, through record-breaking increases in vital crops, brought the Allies closer to victory during the calendar year of 1943.

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Toward meeting emergency food requirements, they increased potato production to 64,044,814 bushels, 52 percent greater than the 1942 aggregate yield, and bean production to 4,175,797 bushels, an increase of 23 percent over the preceding year. The 3,507,520 tons of alfalfa produced, vital as a winter feed for beef and dairy herds, was at a new high. These three critical war food crops were grown on 36.4 percent of the total acreage in cultivation.

The expansion was due both to the concentration of farmers on more important war crops, and to the increases in irrigated areas resulting from enlarged farm activity and from additional lands provided by the Bureau under the war food program. The irrigated area was increased to 4,055,329 acres, highest on record. It is expected that the total 1944 agricultural production on Bureau developments will be brought to an even higher level than that attained in 1943.

From the day—soon after Pearl Harbor—when the Secretary of Agriculture called for “the greatest production in the history of American agriculture” the Bureau has been seeking to extend irrigation systems to bring additional acreages under cultivation and to supply areas suffering with water shortages with a supplementary supply.

The Bureau prepared several accelerated construction programs (in the annual report for fiscal year 1943), listing the projects on which new areas could be served promptly, the amount of critical materials required in the construction, the year crop production could be expected, and other pertinent factors. The detailed information was presented to the War Food Administration, which has the war-time function of evaluating the potential food yield against the amount of strategic materials required, and of recommending clearance of projects to the War Production Board.

The Bureau's activities resulted in approval being given to construct irrigation facilities on 25 projects, which are bringing into cultivation 243,657 acres of new land and providing a supplementary supply for 1,022,125 acres. All clearances were granted in the 5-year except those for Friant Dam and Madera Canal of the Central Valley project (California), facilities on the Gila project (Arizona) to protect an air base from dust storms, and Scofield Dam (Utah) which would provide both flood control and irrigation service.

The projects cleared were:

State	Project	Acreage to be benefited	
		New lands	Supplemental water
	<i>Regular Reclamation Projects</i>		
Arizona	Gila	8,500	
California	Coachella (All-American Canal)	10,000	16,000
	Madera Canal (Central Valley)	20,000	80,000
	Friant Dam (Central Valley)		160,000
	Friant-Kern Canal ¹		
Colorado	Colorado-Big Thompson		320,000
Idaho	Anderson Ranch		340,000
Montana	Fort Shaw Drainage		600
New Mexico	Tucumcari	45,000	
Oklahoma	Lugert-Altus	40,000	
	Carlsbad Drainage		1,200
Oregon	Deschutes	20,000	
Region-California	Klamath-Modoc	12,500	
	Modoc Extension	12,100	27,000
Tah	Provo River		19,300
Washington	Yakima-Roza	32,050	
Subtotal		200,150	964,100
	<i>WCU Projects</i>		
Colorado	Mancos	2,000	8,000
Idaho	Post Falls (Rathdrum Prairie)	2,527	1,000
Montana	Bitter Root	14,600	4,000
	Intake	620	240
	Dodson Pumping	1,200	
	Missoula Valley	900	1,200
Nebraska	Mirage Flats	12,000	
Nevada	Humboldt ²	8,000	17,000
South Dakota	Rapid Valley		12,000
Texas	Balmorhea		1,520
Utah	Newton	1,660	565
	Seofield		12,500
Subtotal		43,507	58,025
Grand total		243,657	1,022,125

¹ Excavation only (pending before the War Production Board).

² Not yet approved by the President.

MUNICIPAL-INDUSTRIAL WATER AIDS WAR

Of equal importance with war power and war food production was a third major Reclamation wartime service—providing municipal-industrial water for major industries and military encampments, and for communities that were important in the war program.

As a multiple-purpose benefit, five operating projects met this need. Through construction on three other projects, additional areas in which shortages exist or threaten will be served with new supplies.

Boulder and Parker Dams in the Pacific Southwest, working as a team, stored fresh water from the Colorado River for diversion through the Metropolitan Water District aqueduct to busy Los Angeles and 12 nearby cities. Direct from Lake Mead above Boulder, 30 million gallons a day were piped to the world's largest magnesium plant at the peak of its activity.

The Contra Costa Canal of the Central Valley project (California) furnished water to important industries in the cities of the Upper San Francisco Bay area. The Rio Grande project (Texas-New Mexico), served El Paso, Tex., and nearby military encampments. Reclamation projects in Utah provided water for the cities of Salt Lake, Ogden, and Provo and a huge, new steel plant.

Raising the height of Altus Dam (Oklahoma) during the year will extend domestic water service during the fiscal year to important consumers in that area. Under construction are the Rapid Valley (South Dakota), and the Tucumcari (New Mexico), projects, which, in addition to providing irrigation service, will supplement the municipal supplies of the cities of Rapid Valley and Tucumcari, respectively. Through enlargement of the Weber-Provo Diversion Canal, principally for irrigation, and the construction of the Salt Lake Aqueduct, supplies will be made adequate for the Salt Lake and Provo areas, where the demand for water has risen sharply due to increased population and military centers.

CROP VOLUME AND VALUE AT RECORD LEVEL

With irrigation activities accelerated in accord with the demands for increased war food supplies, all records on Reclamation projects as to the acreage in production, total volume of crops, and crop values were broken in the calendar year 1943.

The 4,055,329 acres served wholly, or in part, by Bureau facilities on 44 projects in 15 Western States produced 10,660,000 tons of food and forage crops, valued at \$388,670,969. The gross returns were 43 percent, or \$116,622,453, greater than in calendar year 1942, which in turn exceeded the previous year's total by \$112,162,519. The skyrocketing of aggregate values was due partly to the fact that Reclamation farmers, despite labor difficulties and equipment shortages, had nearly doubled their actual production since the year of Pearl Harbor, and partly due to the sharp increase in market prices received for the commodities produced.

The returns cited are exclusive of the values of livestock fattened on Reclamation projects and of dairy and poultry products. These would increase quoted totals by about 25 percent.

The inventory of livestock and equipment on hand December 31, 1943, was valued at \$116,170,312, an increase of \$16,081,407 over the preceding year. Livestock values amounted to approximately \$950 per irrigated farm.

TABLE 1.—*Reclamation areas and crop returns, calendar year 1943¹*

	Irrigable area ²	Irrigated area	Area in cultivation (paying area)	Crop values	
				Total	Per acre
	<i>Acres</i>	<i>Acres</i>	<i>Acres</i>		
Regular projects.....	2,397,241	1,927,660	1,900,088	\$185,263,326	\$97.50
Storage projects.....	484,879	387,103	391,309	27,708,861	70.81
Storage projects (no crop returns reported)	29,376				
Special and Warren Act lands.....	1,896,026	1,633,041	1,615,424	170,606,781	105.61
Additional areas reported:					
Temporarily suspended ³		53,498	53,498	1,593,852	29.79
Leased areas, WRA centers, etc.....		54,027	54,027	3,498,169	64.75
Grand total, 1943.....	4,807,522	4,055,329	4,014,346	388,670,989	96.82
<i>Comparison 1942 and 1943 irrigation results ⁴</i>					
Grand total, 1943.....	4,807,522	3,947,804	3,906,821	\$383,578,948	\$98.18
Grand total, 1942.....	4,821,839	3,936,235	3,821,699	272,048,516	71.19
Increase or decrease, 1942-43.....	⁵ -14,317	+11,569	+85,122	+111,530,432	+26.99
Percent of increase, 1942-43.....		+0.29	+2.22	+41.00	+37.91

¹ A detailed table of area and returns by individual projects is available on request from the Bureau of Reclamation, Washington, D. C.

² Area for which Bureau is prepared to supply water.

³ Generally part of irrigable area, but not subject to construction charges until reclaimed.

⁴ Based on areas reported in both years and excluding temporarily suspended and leased lands.

⁵ Decrease due to readjustment of estimated acreage.

The cultivated area, exclusive of areas temporarily suspended and leased lands, was at a new high of 3,906,821 acres in 1943. This was an increase of 85,122 acres over 1942. On projects entirely constructed by the Bureau, the cultivated area rose to 1,900,088 acres. In 1942 it was 1,873,978 acres. Crop values in 1943 amounted to \$138,181,276, as compared with \$185,263,326 in 1942. The cultivated area on projects furnished supplemental storage from Bureau works and on those under special and Warren Act contracts, totaled 2,006,733 acres in 1943, as compared with 1,947,720 acres in the preceding year. The crop values were \$198,315,622 in 1943 and \$133,867,240 in 1942. On leased areas, Japanese relocation centers, etc., the cultivated area totaled 54,027 acres, and crop values, \$3,498,169.

Eighty-three percent of the irrigable area for which the Bureau was prepared to supply water—4,807,522 acres—was under irrigation in 1943.

Because of labor difficulties and price conditions, the area planted to sugar beets was reduced to 139,014 acres in 1943, a decrease of about 25 percent over 1942. The 1943 yield totaled 1,996,213 tons, which was valued at \$17,494,670.

Reclamation projects also produced small grains, fruit and nuts, long-staple cotton, flax, hops, vegetables, and seeds.

Due to the war, no new land has been opened to homestead entry during the last 3 years.

TABLE 2.—Cumulative crop values—1906-43

	Federal Irrigation projects				Warren Act Lands and Special Contractors				Entire area			
	Irrigated acreage	Net area in cultivation	Total crop value		Irrigated acreage	Net area in cultivation	Total crop value		Irrigated acreage	Net area in cultivation	Total crop value	
			For year	Cumulative total			For year	Cumulative total			For year	Cumulative total
1906	22,300	220,100	244,900	\$5,005,360	.....	.....	.....	.....	22,300	220,100	\$244,900	\$5,005,360
1907	187,628	1,169,040	4,700,460	12,641,248	.....	.....	.....	.....	187,628	1,169,040	4,700,460	12,641,248
1908	289,549	1,260,500	7,635,888	24,561,911	.....	.....	.....	.....	289,549	1,260,500	7,635,888	24,561,911
1909	471,423	1,369,500	11,920,663	37,506,550	.....	.....	.....	.....	471,423	1,369,500	11,920,663	37,506,550
1910	562,311	413,000	12,944,639	50,592,991	.....	.....	.....	.....	562,311	413,000	12,944,639	50,592,991
1911	614,477	470,100	13,086,441	66,600,125	.....	.....	.....	.....	614,477	470,100	13,086,441	66,600,125
1912	684,142	540,900	16,007,134	82,276,534	.....	.....	.....	.....	684,142	540,900	16,007,134	82,276,534
1913	701,271	637,227	16,475,517	98,752,051	.....	.....	.....	.....	701,271	637,227	16,475,517	98,752,051
1914	810,649	703,424	18,164,452	116,916,503	.....	.....	.....	.....	810,649	703,424	18,164,452	116,916,503
1915	922,821	760,035	32,815,972	149,732,475	.....	.....	.....	.....	922,821	760,035	32,815,972	149,732,475
1916	1,026,663	996,784	56,402,313	206,194,788	.....	.....	.....	.....	1,026,663	996,784	56,402,313	206,194,788
1917	1,119,596	1,051,193	66,821,396	273,016,184	.....	.....	.....	.....	1,119,596	1,051,193	66,821,396	273,016,184
1918	1,187,255	1,113,469	88,974,137	301,940,321	.....	.....	.....	.....	1,187,255	1,113,469	88,974,137	301,940,321
1919	1,223,490	1,153,820	66,171,630	428,161,971	.....	.....	.....	.....	1,223,490	1,153,820	66,171,630	428,161,971
1920	1,202,130	1,157,900	49,620,300	477,782,271	.....	.....	.....	.....	1,202,130	1,157,900	49,620,300	477,782,271
1921	1,213,700	1,169,100	50,360,850	528,143,121	.....	.....	.....	.....	1,213,700	1,169,100	50,360,850	528,143,121
1922	1,213,700	1,179,870	65,046,300	653,189,421	.....	.....	.....	.....	1,213,700	1,179,870	65,046,300	653,189,421
1923	1,204,890	1,216,610	66,488,500	725,829,551	.....	.....	.....	.....	1,204,890	1,216,610	66,488,500	725,829,551
1924	1,320,300	1,242,750	77,608,800	803,438,351	.....	.....	.....	.....	1,320,300	1,242,750	77,608,800	803,438,351
1925	1,411,020	1,328,810	60,309,620	797,656,481	.....	.....	.....	.....	1,411,020	1,328,810	60,309,620	797,656,481
1926	1,378,960	1,326,810	70,865,450	868,041,931	.....	.....	.....	.....	1,378,960	1,326,810	70,865,450	868,041,931
1927	1,442,080	1,385,560	80,238,800	948,880,731	.....	.....	.....	.....	1,442,080	1,385,560	80,238,800	948,880,731
1928	1,483,900	1,420,070	87,559,670	1,036,440,401	.....	.....	.....	.....	1,483,900	1,420,070	87,559,670	1,036,440,401
1929	1,504,810	1,467,097	64,418,940	1,100,859,341	.....	.....	.....	.....	1,504,810	1,467,097	64,418,940	1,100,859,341
1930	1,522,718	1,462,563	40,121,089	1,149,980,430	.....	.....	.....	.....	1,522,718	1,462,563	40,121,089	1,149,980,430
1931	1,555,148	1,506,320	31,165,572	1,172,146,182	.....	.....	.....	.....	1,555,148	1,506,320	31,165,572	1,172,146,182
1932	1,589,770	1,529,903	48,138,576	1,220,284,758	.....	.....	.....	.....	1,589,770	1,529,903	48,138,576	1,220,284,758
1933	1,552,124	1,464,405	59,628,327	1,279,913,085	.....	.....	.....	.....	1,552,124	1,464,405	59,628,327	1,279,913,085
1934	1,640,936	1,604,166	63,601,663	1,343,514,748	.....	.....	.....	.....	1,640,936	1,604,166	63,601,663	1,343,514,748
1935	1,702,192	1,629,174	78,902,818	1,422,417,561	.....	.....	.....	.....	1,702,192	1,629,174	78,902,818	1,422,417,561
1936	1,725,453	1,700,969	72,803,649	1,495,311,215	.....	.....	.....	.....	1,725,453	1,700,969	72,803,649	1,495,311,215

1938.....	1,777,584	1,704,363	67,890,804	1,563,171,019	1,329,115	1,276,332	45,993,656	980,733,955	3,106,998	3,040,995	113,403,460	2,543,904,974
1939.....	1,922,869	1,903,269	73,760,054	1,636,940,673	1,218,108	1,174,863	40,913,940	1,021,047,095	3,140,976	3,078,072	114,082,794	2,675,987,708
1940.....	2,152,808	2,138,927	80,098,196	1,717,038,899	1,238,262	1,177,633	37,690,481	1,058,737,576	3,391,970	3,316,030	117,788,677	2,775,776,445
1941.....	2,178,288	2,178,288	110,399,806	1,827,438,675	1,130,204	1,202,172	46,486,191	1,108,223,707	3,338,383	3,380,460	159,885,997	2,935,602,442
1942.....	2,277,955	2,259,653	155,619,716	1,963,098,391	1,602,907	1,582,046	116,428,800	1,224,652,507	3,890,862	3,821,699	272,048,516	3,207,710,685
1943.....	2,422,288	2,398,922	218,064,208	2,201,122,569	1,635,641	1,615,424	170,806,761	1,395,259,328	4,055,329	4,014,346	388,670,969	3,596,361,927

Includes projects constructed by the United States and those for which supplemental water is furnished from storage works built by United States.

1 Includes projects constructed by the United States and those for which supplemental water projects.

2 Estimated.

3 Does not include project acreage and returns from All-American Canal (Imperial Valley) and 5 supplemental water projects.

4 Does not include project acreage and returns from 2 supplemental water projects. Estimated data for Imperial Valley included under "Special contractors." Includes

5 Does not include project acreage and returns from 1 supplemental water project. Estimated data for Imperial Valley included under "Special contractors." Includes

cultivated acreages and returns from class 5 lands, leased areas, and other lands irrigated from project works.

PROJECT PLANNING HAS POSTWAR OBJECTIVE

Foresight in the programming of its studies and investigations of potential projects and of river basins and subbasins made it possible for the Bureau of Reclamation to present to Congress in June 1944 a comprehensive inventory of postwar construction.

Planning activities directed in pre-war days toward an orderly agricultural and industrial development of the West, and early in the war toward increasing production of electric power and war food supplies, created a large shelf of projects which can be undertaken after the war to provide emergency employment and permanent settlement opportunities. During this fiscal year, with the emphasis shifted to planning for the postwar readjustment, additional projects were added to the reserve.

About 170 irrigation and multiple-purpose projects and approximately 50 river basins and subbasins were under study during the year. The Bureau investigates river basins in conjunction with studies of individual projects to assure orderly regional development.

The most impressive of the basin-wide studies completed during the year was the report on the Missouri River. It proposes construction costing a billion and a quarter dollars in the upper basin area, which construction would ultimately bring under irrigation 4¾ million acres of new land in seven States and supplement the water supply for half a million acres suffering shortages.

In connection with the June 1944 project inventory, there are on hand 53 detailed field reports involving construction costs amounting to \$526,000,000, and 25 detailed field reports of Water Conservation and Utilization projects under the war food program, estimated to cost \$21,000,000.

Postwar planning was given added impetus in June 1944, when Assistant Commissioner William E. Warne held conferences with Bureau regional officials in each of the six regions to determine the status of investigations and to plan for increased activity in this field. As a result of the meetings definite deadlines calling for the completion in the field of basin reports were set for early in the next fiscal year. These are: Columbia River Basin, December 1; Rogue River Basin, December 1; Central Valley, October 15; Santa Barbara County, September 15; Russian River Basin, September 1; Lower Colorado River Basin, November 1; Upper Colorado River Basin, November 1; Great Salt Lake Basin, December 1; Nueces River Basin, August 15; Rio Grande Basin, September 1; Red River Basin, September 15; Pecos River Basin, October 1; Guadalupe River Basin, October 15; Colorado River (Texas) Basin, November 1; and Arkansas River Basin, December 1.

As part of its planning activities, the Bureau reviewed flood control reports of the Corps of Engineers, War Department. This work was carried on under the terms of an agreement, dated August 14, 1939, through which the Bureau, the Department of Agriculture, and the War Department interchanged information on multiple-purpose projects. On December 29, 1943, this agreement was superseded by a four-party agreement, which made the Federal Power Commission also a participant, and changed the name of the joint committee to the "Inter-Agency River Basin Committee."

SERVICEMEN SEEKING POSTWAR FARMS

Forecasting the great need for postwar expansion of reclamation in the West, war veterans and emergency workers evinced a growing interest during the fiscal year in obtaining farms on Federal Reclamation developments. A growing number of inquiries concerning land settlement opportunities were received in the Washington, D. C., headquarters and in the many Bureau offices near military posts and war production centers.

Further evidence of the demand for land was the enlarged activity in the transfer of ownerships on irrigation projects, particularly near war industries where workmen, receiving high wages, purchased land for postwar homes.

In preparation for meeting the enlarged requirements for land, the Bureau's land use and settlement activities were pointed to postwar objectives. At the end of the year the Bureau had completed a program for presentation to Congress as a possible basis for legislation to provide settlement opportunities commensurate with anticipated needs. The program contained various recommendations for settlement preference for veterans, and provisions to assure that suitable farm units will be available on reasonable terms and conditions. It also called for farm advisory services.

SPECIAL STUDIES WILL AID SETTLEMENT PROGRAM

Three special studies of settlement and development problems advanced by the Bureau during the fiscal year will be of definite postwar value in making farm opportunities available for returning servicemen.

To provide maximum benefits from the complex multiple-purpose Central Valley project of California, a great volume of factual material on all phases of the proposed development has been collected through a series of project studies. These investigations are to be concluded early in the next fiscal year. Many Federal and State agencies are participating in the programming.

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The Bureau has substantially completed the studies known as the Columbia Basin Joint Investigations, which have as their objective a general plan for the settlement of a million-acre area to be watered by Grand Coulee Dam, and to prepare detailed plans for areas to be irrigated relatively soon.

The investigation of economic and agricultural aspects of the practical problems which will confront settlers on the type of arid desert soil that characterizes the Yuma-Mesa Division of the Gila project (Arizona) was advanced during the year. This large-scale predevelopment demonstration was undertaken in January 1942 in accordance with a directive from the Senate Committee on Appropriations. At the end of the fiscal year 320 acres were planted to alfalfa, and 590 acres prepared for planting of this crop next fall.

The development of 4,200 acres of public lands which the current schedule, approved by the War Production Board, contemplates, will aid in meeting the demand for new farms and new homes. A total of 150,000 acres of new lands, both public and private, may be developed rapidly on the Yuma-Mesa as a result of the knowledge gained from the investigation.

CONSTRUCTION CONTINUES DESPITE CURBS

Construction activities of the year were highlighted by the completion of Shasta Dam, second largest concrete structure in the world, and key feature of the Central Valley project (California), and the "holing through" of the 13.1 mile long Alva B. Adams tunnel of the Colorado-Big Thompson project (Colorado). Both Reclamation achievements were accomplished at the close of the fiscal period.

Shasta Dam is 602 feet high, 3,500 feet long at the crest, and 265 feet wide at the base. On June 30, 1944, it contained 6,391,682 cubic yards of concrete. Construction was begun in September 1938.

The transmountain tunnel cuts through the Rocky Mountains near Estes Park, Colo. When lined with concrete, which operation is now in progress, it will carry a supplemental supply of water from the headwaters of the Colorado River, on the west side of the Continental Divide, to 615,000 acres facing shortages in northeastern Colorado, on the east slope.

The Bureau's construction activities were retarded on most projects as the aftermath of a sweeping War Production Board stop-construction order issued in the fall of 1942, which halted all work except power installations on five projects. Since that time the War Production Board has cleared a number of projects to create work for Japanese evacuees from the Pacific coast and for conscientious objectors, to supply municipal-industrial water, to provide dust control for an air base, and to expand food production. Twenty-five projects were cleared under the war food program.

Work remained at a standstill on Davis Dam (Arizona-Nevada); Payette Division, Boise Project (Idaho); Friant-Kern Canal of the Central Valley project (California); irrigation features of the Columbia Basin Project (Washington); Eden, Kendrick, and Riverton projects (Wyoming).

Additional details on construction activities are provided in the summary of the activities of the various regions.

BUREAU ENGINEERS FOREMOST AS DAM BUILDERS

Since 1902 179 dams—5 of them the largest concrete structures in the world—have been constructed by the Bureau of Reclamation on 61 irrigation and multiple-purpose projects in 16 Western States. The 5 mammoth monoliths, which have given Bureau engineers the reputation of being foremost in the field of dam designing and construction are, in order of volume: Grand Coulee (Washington), Shasta (California), Boulder (Arizona-Nevada), Friant (California), and Marshall Ford (Texas).

The Bureau has also built the following existing facilities: 31 power-plants, 5,937 miles of transmission lines, 212,549 canal structures, 14,421 bridges, 358 tunnels having a combined length of 110.7 miles, 5,121 miles of ditches and drains, 23,683 culverts, 6,555 flumes, 2,322 miles of pipe, and 4,344 miles of roads. In the 42 years of its existence as a Federal agency, the Bureau has excavated 621,790,400 cubic yards of earth and rock—more than 60 times the bulk of the 7 great pyramids of Egypt. A total of 34,225,500 cubic yards of concrete have been poured, more than 6 times as much as used in all the locks and structures of the Panama Canal. In the preparation of this concrete, 38,475,900 barrels of cement were used.

STORAGE CAPACITY AT NEW PEAK

The storage capacity of 81 Reclamation reservoirs was increased by about 5 million acre-feet during the fiscal year. The June 30, 1944, capacity was 69,174,919 acre-feet. The active water storage—more than 53½ million acre-feet—was also at a record level. The largest of the man-made lakes were impounded by Boulder Dam (Arizona-Nevada), Grand Coulee Dam (Washington), and Marshall Ford Dam (Texas). Storage of water in the reservoir behind Shasta Dam was begun on December 30, 1943, and behind Friant Dam on February 22, 1944.

JAPANESE EVACUEES ON THREE PROJECTS

Increased war food production, valued at \$460,272, resulted from the activity in 1943 of persons of Japanese ancestry on 3 Reclamation projects, to which they were evacuated from West Coast military zones

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early in the war. The approximately 38,000 men and women housed in the War Relocation Centers harvested 4,861 acres of hitherto undeveloped land.

The camps are located on the Gooding Division of the Minidoka project (Idaho), which at the peak of the year's activity held 10,000 persons; the Tule Lake Division of the Klamath project (Oregon-California), 18,027; and the Heart Mountain Division of the Shoshone project (Wyoming), 9,800.

In addition to farm activities, the Japanese aided in Bureau construction operations on the Minidoka and Shoshone projects. The camps were erected by the Army engineers, and the Bureau had charge of the work crews.

SMALL C. P. S. CREWS BUILDING DAMS

Construction was advanced on three medium-sized irrigation dams on the Rapid Valley (South Dakota), Deschutes (Oregon), and the Mancos (Colorado) projects by conscientious objectors housed in Civilian Public Service camps, established by the Selective Service System. The assignees also helped clear the reservoirs and performed other work. At the end of the year 124 men were stationed in the Rapid Valley camp, 90 in the Deschutes center, and 117 on the Mancos project. In the first 2 camps a religious organization was responsible for the welfare of the men, and the Bureau was in charge of the work. On the Mancos project all operations were supervised by Reclamation officials.

A small group of men in a camp administratively assigned to the Farm Security Administration was employed on Reclamation activities on the Buffalo Rapids project (Montana).

WATER CONSERVATION AND UTILIZATION CONSTRUCTION STIMULATED

Enactment of amendments to the Water Conservation and Utilization Act, and added emphasis on expansion of production of war food crops, caused increased activity under the Water Conservation and Utilization program during the year. Work continued on six projects authorized for construction before the war. Preconstruction activities were underway on six additional projects approved under the war food program.

The amendments to the Water Conservation and Utilization Act authorize, for the duration of the war, the expenditure of appropriated funds for project construction in lieu of contributions formerly made by the Work Projects Administration and the Civilian Conservation Corps.

The projects under construction are: Mirage Flats (Nebraska), Buffalo Rapids No. 2 (Montana), Newton (Utah), Rapid Valley (South Dakota), Mancos (Colorado), and Scofield (Utah).

Other projects cleared for construction and the acreages involved are: Intake (Montana), Missoula (Montana), Dodson (Montana), Bitterroot (Montana), Post Falls unit, Rathdrum Prairie project (Idaho), and Balmorhea (Texas).

Construction remains at a standstill, due to War Production Board stop orders on the Fallon unit of the Buffalo Rapids project (Montana), and on the Eden project (Wyoming).

During the year the Farm Security Administration, in accordance with the original approval by the President, assumed supervision and control of the operation and maintenance work on the Buford-Trenton project (North Dakota), which is providing water for 4,000 acres. The Farm Security Administration is also in charge of land development and settlement activities on the Buffalo Rapids No. 1 project, on which about 15,000 acres of land have been put under irrigation.

REGIONAL ACTIVITIES ADVANCE RECLAMATION

While not yet fully effectuated, chiefly because of difficulties in obtaining suitable personnel, the regionalization of the Bureau of Reclamation, begun in September 1943, intensified operations in all fields of Reclamation activity. The following is a summarization of the most important activities in each of the areas.

REGION I

The outstanding wartime activities in Region I during the fiscal year were the expansion of power production at Grand Coulee Dam (Washington), for industrial plants, and the extension of irrigation service on the highly productive Roza Division of the Yakima project (Washington). The region includes the States of Oregon, Washington, Idaho, and western Montana.

The Bureau's power program at Grand Coulee was spectacular. Three units rated at about 325,000 kilowatts were installed to complete, in 3 years, the transformation of an empty shell of a building into the second largest powerplant in the world. The fiscal year output was approximately 5,800,000,000 kilowatt-hours, double the production of the preceding year. In March 1944, the plant produced 621 million kilowatt-hours, a world's record for quantity of power generated during 1 month by a single hydroplant. About 98 percent of the Grand Coulee energy is consumed by war industries.

On the Roza Division, the acreage under irrigation was increased during the year from 9,000 to 15,000 acres. Ultimately the gravity system, under construction, will serve a total of 47,000 acres, whereon excellent settlement opportunities for returning servicemen and demobilized war workers could be provided.

Construction work in Region I was continued, under wartime restrictions, on the Deschutes project (Oregon), Anderson Ranch Dam

of the Boise project (Idaho), and the Gooding Division of the V doka project (Idaho).

Construction of Anderson Ranch Dam, which when completed will be the highest earth-fill structure in the world and will provide supplemental irrigation water for 340,000 acres in the fertile Boise Valley, was resumed after delay of about a year due to War Production Board restrictions. About 1,300,000 cubic yards of embankment and 700,000 cubic yards of rock-fill were placed during the year to bring the total yardage in place to about 2¼ million. Ultimately the dam will contain 9,600,000 cubic yards of material.

Design and location of irrigation features and development of settlement pattern for the Columbia Basin project (Washington) were advanced. This project, of which Grand Coulee Dam is the key structure, offers the largest settlement opportunities of any single project in the Bureau's postwar program.

REGION II

Completion of Shasta Dam, dominant structure of the Central Valley project (California), at the end of the fiscal year, climaxed construction activities in this region, which includes central and northern California, and a small portion of Oregon. The Shasta Reservoir, gradually filling since December 30, 1943, contained 1,175,129 acre feet of storage on June 30, 1944, more than a third of its maximum capacity.

The first two of five 75,000-kilowatt generators to be installed at the Shasta powerplant began production in June 1944, sending their output, under a wartime contract, over the newly completed Government transmission line to a connection with the Pacific Gas & Electric system at Oroville, Calif.

Three other major items of the Central Valley project were featured in the region's construction program. Keswick Dam and powerplant, construction of which was halted for a time by the War Production Board, were practically completed. Work was being advanced rapidly on four contracts for the construction of 28 miles of the Madras Canal, which when completed will serve 20,000 acres of new land and provide supplemental service to 80,000 acres. Eight miles of the canal had been completed previously.

Installation at Friant Dam of needle valves borrowed from Bixby Dam to provide temporary control over the San Joaquin River was practically completed. Water storage in Millerton Lake was begun February 22, 1944, and had reached 290,490 acre feet—approximately half maximum capacity—at the end of the year.

Construction of the 160-mile Friant-Kern Canal of the Central Valley project remains at a standstill. An application for clearance is pending before the War Production Board.

With War Production Board authorization under the war food program, granted on September 8, 1943, construction was resumed on the Iodoc unit of the Klamath project (Oregon-California). On June 3, 1944, the War Production Board approved construction of the extension of this unit.

Region II is featured prominently in the Reclamation postwar inventory. Twenty-nine projects, which would serve 1,281,500 acres of new land and provide supplemental water to 3,485,000 acres now inadequately served are contemplated. Power installations on authorized projects would be increased by 446,500 kilowatts and an estimated 288,900 kilowatts of firm capacity would be provided on projects under study. The over-all cost of the postwar program in this region, on the basis of 1940 prices, would be \$551,360,000.

REGION III

With more than half the electric power produced by Reclamation power plants on projects in 12 States coming from Bureau installations within its boundaries, Region III was outstanding as a contributor to the prosecution of the war. This region includes nearly all of the State of Arizona, Southern California, and small portions of Nevada, New Mexico, and Utah.

Approximately 7 billion kilowatt-hours of energy were generated during the year. More than 50 percent of all the power used by the war industries of Southern California, southern Nevada, and Arizona was produced by Bureau generators in this area. These are located on five projects: Yuma and Salt River (Arizona); Boulder Canyon (Arizona-Nevada); Parker Dam (Arizona-California) and All-American Canal (California). After the war, and as the need arises, the present installation can be doubled.

Although no capacity was added, the output of the Boulder Dam power plant, largest in the world, was increased by 20 percent over the preceding year. By increasing the production of its generators, the output was brought to a new high of 6 $\frac{1}{3}$ billion kilowatt-hours. Revenues from the sale of this energy and for generating charges totaled \$8,162,422.86. One-fourth of the plant's production was consumed by a huge magnesium plant nearby. A new 82,500-kilowatt generator is scheduled to go into operation in September 1944.

Region III also contributed heavily toward the Nation's war food supply. The 744,380 acres of land served by Reclamation facilities produced crops having a gross value of \$109,371,178—an all-time high for the area.

Twenty-three of the projects in the postwar inventory are located in this region. The over-all cost of constructing these developments, on the basis of pre-war prices, is estimated at \$720,015,000.

Three of the projects have been authorized for construction, namely: Boulder Dam, with 287,500 kilowatts additional power capacity remaining to be installed, the Mesa Unit of the Gila project (Arizona), to provide water for 33,000 acres of new lands, and the All-American Canal (California) from which 400,000 acres of new lands may be irrigated and 20,000 provided with supplemental water.

Construction of a fourth project, Davis Dam, to provide river regulation and 225,000 kilowatts of power, was halted by the War Production Board late in 1942. Nineteen projects which will irrigate 454,235 acres of new lands, furnish supplemental water to 374,200 acres, and provide 1,099,200 kilowatts of firm power are under study.

REGION IV

With large-scale construction halted or retarded by emergency conditions, project planning activities received major attention in region IV. This region includes practically all of the States of Nevada and Utah, the southwestern portion of Wyoming, and that portion of Colorado west of the Continental Divide.

Work was advanced on more than 25 individual projects and sub-basins, with 6 reports completed and 14 reports nearing completion. The reports form the foundation for that portion of the reclamation inventory planned for region IV. The outline calls for the construction of 46 projects. These would serve 313,790 acres of new land, provide supplemental service to 684,940 acres, make available 8,600 kilowatts of new energy on authorized projects and 148,000 kilowatts of firm power capacity on proposed developments. On the basis of 1940 prices, the estimated construction cost is \$237,603,000.

Construction continued during the year on four projects. Conscientious objectors aided in constructing a medium-sized dam on the Mancos project (Colorado). The Newton Dam on the Newton project (Utah) was practically completed, and work was advanced on the Scofield project (Utah). Sufficient work was completed during the past 2 years on the canals of the Provo River project (Utah) to provide supplemental water in 1943 to more than 25,000 acres of highly developed lands and serve an industrial supply to the new \$200,000,000 Geneva Steel plant near Provo, Utah. Progress was also made on the Salt Lake Aqueduct of the Provo River project to make additional water available to Salt Lake City.

REGION V

Planning for postwar construction received primary consideration in Region V. In this region, comprising all of Texas and Oklahoma, that portion of New Mexico east of the Continental Divide, the south-east quarter of Colorado, and the southern half of Texas, 2 projects

are in operation, 3 under construction, 3 authorized, and 26 are under study.

More than 2,653,000 acres of land are now irrigated in the area; 194,000 of which are included in Federal reclamation projects. Construction of 30 projects outlined in the postar inventory would provide an irrigation water supply for 637,310 acres of additional land and furnish a supplemental supply of 1,615,980 acres now partially irrigated. About 18,000 kilowatts of additional electric power could be installed on authorized projects and 36,000 kilowatts of firm capacity made available on proposed developments. Total construction costs, based on 1940 prices, are estimated at \$296,786,000.

Construction was in progress, under the war food program, on the Tucumcari project (New Mexico), and the Altus project (Oklahoma). Work on both was suspended by the War Production Board in December 1942. In April 1944 both projects were cleared for war food construction. Development plans for the Tucumcari project call for 17,000 acres to be brought into production by 1945, with additional acreages subsequently. The Altus project by 1945 is to provide irrigation service to 20,000 acres and a domestic water supply to the city of Altus. It is scheduled to serve an additional 20,000 acres in 1946.

The three projects authorized are Valley Gravity Canal and Storage project (Texas), San Luis Valley project (Colorado), and the Balmorhea project (Texas). The latter was approved by the President in May 1944, and construction work will be begun as soon as negotiations for the purchase of additional water rights and for repayment contracts are completed. Construction on the Valley Gravity and San Luis Valley was halted by the War Production Board.

REGION VI

The Bureau of Reclamation's project planning activities in the West drew national recognition in the fiscal year because of the accomplishments in this region. Completed here was a comprehensive report on the conservation, control, and use of the water resources of the entire Missouri River Basin, one of the Nation's greatest drainage areas.

Region VI includes the States of North Dakota, South Dakota, Nebraska, the northern half of Kansas, northeastern Colorado, all of Montana east of the Continental Divide, and a major portion of Wyoming.

The investigations report was the culmination of more than 5 years of planning work. It was presented to Congress early in June 1944, and bills were introduced in both houses that would authorize the construction of the initial stages of the development planned.

Constituting a major item in the Bureau's postwar outline, the report proposes the irrigation of 4,760,000 acres of new land, the construction of about 90 multiple-purpose reservoirs, 16 power plants with a total installed capacity of 723,500 kilowatts and interconnecting transmission systems, flood control for the lower reaches of the Missouri River and many of its tributaries, and a sustained flow for navigation from Sioux City to St. Louis.

The estimated total construction cost of the entire program is \$1,250,000,000, and the initial developments recommended for construction would involve an expenditure after the war, of approximately \$200,000,000, for the irrigation and power features alone.

Completion on June 10, 1944, of the excavation of the 13.1-mile long transmountain tunnel of the Colorado Big-Thompson project through the Rocky Mountains to carry supplemental water from the west to the east slope was the most important construction achievement of the year in this region.

State	Project	Irrigated farms		Towns on or tributary to the project		Number of schools	Number of churches	Banks			Special Warren Act contractors	
		Number	Population	Number	Population			Number	Deposits	Number of depositors	Irrigated farms ¹	Population
Arizona	Regular											
	Salt River	13,158	42,000	12	165,000	98	161	7	140,000,000	80,000	728	4,590
	Yuma	1,727	3,295	5	18,590	15	34	1	2,100,000	2,300		
	Orland	673	1,918	1	1,366	6	15	1	2,200,000	2,814		
	Grand Valley	538	2,423	6	19,850	17	40	3	17,784,510	10,271	803	1,816
Colorado	Uncompahgre	1,792	5,103	3	7,980	28	35	3	7,036,550	6,810	167	1,872
	Rose	4,163	15,100	16	55,055	118	130	4	(3)		4,784	19,516
	Minidoka	3,542	11,966	10	14,532	33	74	6	(3)		11,161	50,614
Idaho	Bitter Root	335	1,134	6	3,000	18	10	4	4,233,873	5,418		
	Frenchtown	42	153	1	110	1	1	(9)				
	Huntley	644	1,643	5	624	7	6	1	379,318	450		
	Milk River	597	2,409	15	10,939	30	36	7	12,653,670	8,763		
	Sun River	1,025	2,734	5	773	11	15	1	553,518	758		
Montana	Lower Yellowstone	676	2,265	7	4,245	18	22	3	4,197,605	4,700		
	North Platte	2,987	9,160	16	27,749	73	67	9	20,427,872	18,060		
	Newlands	2,765	2,909	4	2,379	16	12	1	2,546,500	2,531		
	Carlsbad	459	1,954	4	20,900	14	20	2	6,039,870	7,080		
	Rio Grande	6,456	25,747	40	135,987	83	184	6	88,570,428	52,634	144	1,507
New Mexico	Umatilla	396	1,320	4	1,873	7	15	1	2,212,155	2,200	39	61
	Vate	514	2,056	4	1,300	8	14	1	1,701,920	1,500		
	Klamath	970	2,812	5	28,169	30	35	5	(3)		537	1,611
	Owyhee	1,530	6,077	8	14,860	28	37	5	5,697,700	5,500	229	925
	Belle Fourche	672	2,007	5	3,750	20	15	3	8,194,007	8,061		
Oregon	Strawberry Valley	2,000	8,680	13	18,500	29	30	2	3,434,255	3,400		
	Okanogan	397	9,952	3	5,000	74	83	2	17,350,017	16,402	4,316	17,466
	Yakima	5,483	18,145	24	86,557	7	21	2	14,938,246	11,000		
	Kendrick	500	1,636	7	24,500	17	19	1	1,490,000	1,800	2	9
	Riverton	1,034	2,176	5	2,718	4	15	1	1,983,455	1,650		
Shoshone												
Subtotal		53,395	177,751	237	649,196	814	1,138	93	362,696,479	254,102	22,890	98,387

Footnotes at end of table.

TABLE 3.—Settlement and economic data, 1943—Continued

State	Project	Irrigated farms		Towns on or tributary to the project		Num-ber of schools	Num-ber of churches	Banks		Number of depositors	Special Warren Act contractors	
		Num-ber	Popula-tion	Num-ber	Popula-tion			Num-ber	Deposits		Irrigated farms ¹	Popula-tion
California	<i>Supplemental storage projects</i>											
	All-American Canal:											
	Imperial Valley											
	Coachella Valley											
	Central Valley											
Colorado	Fruitgrowers Dam											
	Pine River											
	Upper Snake River											
	Humboldt											
	Truckee Storage											
Oregon	Baker											
	Burnt River											
	Deschutes (Central Oregon I. D.)											
	Stanfield											
	Westland											
Utah	Hyrum											
	Moon Lake											
	Ogden River											
	Provo River (Deer Creek divi-sion)											
	Sanpete											
Montana	Weber River											
	Subtotals											
	<i>Water conservation and utilization projects</i>											
	Buffalo Rapids Extension											
	Grand total											

Grand total

¹ Project irrigated area with the water supply for Bureau of Reclamation projects.

² Project irrigated area with the water supply for Bureau of Reclamation projects.

³ Project irrigated area with the water supply for Bureau of Reclamation projects.

⁴ Project irrigated area with the water supply for Bureau of Reclamation projects.

⁵ Project irrigated area with the water supply for Bureau of Reclamation projects.

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Considerable educational material was prepared and disseminated, including slide lectures and films designed to assist farmers in the development of pastures, measurement and proper use of irrigation water, and weed control.

SOIL AND CONSERVATION PROGRAM CONTINUED

Extensive field work in the lining of canals to conserve water and prevent damage to irrigable lands by seepage was carried on under the Soil and Moisture Conservation program. Asphalt and bentonite linings were installed and tested from the standpoint of design, placement, effectiveness, and cost, and results compared with standard concrete and earth linings. Other activities included: Prevention of canal bank erosion by vegetative plantings, investigation of methods to reduce siltation of canals and reservoirs, drainage work to relieve seepage, and installation of accurate devices for measurement of irrigation water, and studies of the requirements for and application of irrigation water by reason of relative impermeable characteristics of some soils.

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TABLE 3.—Settlement and economic data, 1943—Continued

State	Project	Irrigated farms		Towns on or tributary to the project		Number of schools	Number of churches	Banks			Special Warren Act contractors	
		Number	Population	Number	Population			Number	Deposits	Number of depositors	Irrigated farms ¹	Population
California	<i>Supplemental storage projects</i>											
	All-American Canal:											
	Imperial Valley	4,488	27,000	8	33,723	157	76	7	(³)			
	Coachella Valley ²	(³)	8,000	4	4,400	9	12	2	(³)			
	Central Valley	30	(³)									
Colorado	Fruitgrowers Dam	75										
	Pine River	325	1,288	5	1,047	20	12	1	400,000	500		
	Upper Snake River	1,143	4,816	16	9,460	23	30	3	2,460,000	6,342		
	Humboldt	90	287	1	1,287	23	4	1	2,020,737	1,497		
	Truckee Storage	606	2,520	2	31,318	21	21	3	31,650,000	22,187		
Oregon	Baker	40	160	1	8	3	0					
	Burnt River	118	460	8	1,875	8	4	1	336,000			
	Deschutes (Central Oregon I. D.)	646	2,050	3	15,000	23	32	4	4,525,228	5,210		
	Stanfield	161	484	1	500	1	3					
	Westland	97	201	0	0	0	0	0	0	0		
Utah	Hyrum	516	1,520	3	3,730	5	6	0	0	0		
	Moon Lake	678	2,500	10	3,675	15	23	1	1,148,390	2,475		
	Ogden River	1,100	4,300	8	78,687	34	60	4	40,000,000	36,000		
	Provo River (Deer Creek division)	1,260	3,000	5	37,200	24	47	6	17,366,340	14,262		
	Sanpete	257	1,086	2	2,933	5	4	1	800,000	900		
Montana	Weber River	3,000	15,000	21	26,706	31	26	8	50,000,000	40,000		
	Subtotals	14,630	74,672	98	251,549	382	360	42	150,706,695	129,373		
	<i>Water conservation and utilization projects</i>											
	Buffalo Rapids ³	115	240	3	5,600	11	16	4	4,500,000	5,500		
	Eden	90	(³)									
Grand total		68,220	252,663	338	906,345	1,207	1,514	139	517,902,174	388,975		

¹ Farms furnished partial or whole water supply by Bureau-constructed works.
² Estimate of population used.
³ Data not reported.

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Extensive field work in the lining of canals to conserve water and prevent damage to irrigable lands by seepage was carried on under the Soil and Moisture Conservation program. Asphalt and bentonite linings were installed and tested from the standpoint of design, placement, effectiveness, and cost, and results compared with standard concrete and earth linings. Other activities included: Prevention of canal bank erosion by vegetative plantings, investigation of methods to reduce siltation of canals and reservoirs, drainage work to relieve seeped land, installation of accurate devices for measurement of irrigation water, and studies of the requirements for and application of irrigation water by reason of relative impermeable characteristics of some soils.

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TABLE 3.—Settlement and economic data, 1943—Continued

State	Project	Irrigated farms		Towns on or tributary to the project		Num-ber of schools	Num-ber of churches	Banks		Special Warren Act contractors		
		Num-ber	Popula-tion	Num-ber	Popula-tion			Num-ber	Deposits		Number of depositors	Irrigated farms ¹	Popula-tion
California	<i>Supplemental storage projects</i>											
	All-American Canal:											
	Imperial Valley.....											
	Coachella Valley ²											
	Central Valley.....											
	Fruitgrowers Dam.....											
	Pine River.....											
	Upper Snake River.....											
	Humboldt.....											
	Truckee Storage.....											
Oregon	Baker.....											
	Burnt River.....											
	Deschutes (Central Oregon I. D.).....											
	Stanfield.....											
	Westland.....											
	Hyrum.....											
	Moon Lake.....											
	Ogden River.....											
	Provo River (Deer Creek division).....											
	Sanpete.....											
Utah	Weber River.....											
	Subtotals.....											
	<i>Water conservation and utilization projects</i>											
	Buffalo Rapids ²											
	Eden.....											
	Montana	Grand total.....										
		Grand total.....										

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completed projects or projects under investigation, were not entry during the fiscal year.

Approximately 929,500 acres of public land were under lease in calendar year 1943; 688,000 acres for grazing purposes, 230,000 for agricultural uses (8,500 more than in 1942), and 188,000 for special uses, including the areas reserved for Japanese evacuees. Some additional lands were leased early in 1944 for expanding stock and farming operations to increase food production. Reclaimable land temporarily transferred to the Grazing Service to provide efficient range administration under the Taylor Grazing Act was reduced by the vacation of reclamation withdrawals and by transfer to the War Relocation Authority for Japanese encampments.

AMENDATORY CONTRACT NEGOTIATIONS ADVANCED

Under the Bureau's reorganized plan of procedure, active progress was made at the close of the fiscal year toward completion of negotiations of amendatory repayment contracts with a number of water users' organizations. To date eight contracts have been executed. One contract negotiated with the Klamath Drainage District of the Klamath project (Oregon-California) was approved by Congress June 17, 1944. Power features contained in several agreements given special attention.

Reclassification of irrigable lands under provisions of the Act was completed or in progress on approximately 298,000 acres in projects or divisions of projects.

REQUESTS FOR RELIEF CONTINUE TO DECREASE

With farm incomes in 1942 and 1943 at high levels and prospects good for continuing high returns in 1944, requests and authorization for temporary relief from the payment of accrued construction costs dropped to new lows during the fiscal year. Applications for an amount of \$108,092.33, were submitted by eight water-users' organizations. Relief totaling \$21,916.44 was granted to four applicants.

In comparison, applications totaling \$189,922.44 were received during the fiscal year 1943 from six water-user groups and seven individuals. Relief in the amount of \$24,530 was authorized.

NEW LEGISLATION ADVANCES RECLAMATION

Three major items of legislation affecting Reclamation were enacted during the year. The Water Conservation and Reclamation (Wheeler-Case) Act was amended, construction of the Horse Dam (Mont.) was authorized, and Congress gave its approval to the Belle Fourche Compact.

AMENDMENTS TO WATER CONSERVATION AND UTILIZATION ACT PASSED

To provide for a quick expansion of potential food-producing acres on projects in the process of construction under the Water Conservation and Utilization Act of October 14, 1940 (54 Stat. 1119), Congress amended this legislation on July 16, 1943 (Public, 152, 78th Cong., 1st Sess.).

The amendments authorize the expenditure of appropriated funds for construction in lieu of nonreimbursable money or services formerly contributed by the Work Projects Administration and the Civilian Conservation Corps, which were disbanded early in the war. The original Act has as its objective the stabilization of agriculture and employment in the Great Plains and other semiarid areas to the westward which are most seriously affected by periodic droughts.

CONGRESS GIVES CONSENT TO BELLE FOURCHE COMPACT

The long-standing controversy between the States of South Dakota and Wyoming over the division of waters of the Belle Fourche River was brought to an end in February 1944, when Congress gave its consent to the Belle Fourche Compact.

The legislation clears the way for construction of works to provide supplemental storage for irrigation projects in South Dakota and also storage for potential projects in Wyoming. Incorporated in the compact is a provision giving Federal recognition of water rights as against an assertion of power under the Commerce Clause of the Constitution. It requires the Federal Government to respect established water rights as property and to consult with State officials with respect to specific Federal programs or projects.

HUNGRY HORSE DAM APPROVED AS POSTWAR PROJECT

Construction of Hungry Horse Dam, a major feature of the comprehensive plan for multiple-purpose development of the Columbia River in the Pacific Northwest, was authorized by Congress on June 5, 1944 (Public, 329, 78th Cong., 2d Sess.). This structure, to be erected 4 miles above the confluence of the South Fork and Flathead Rivers in Montana, is a prominent item in the Bureau's inventory of irrigation and multiple-purpose projects for postwar construction. It would increase the firm power output of Grand Coulee and Bonneville Dams through regulation of the flow of the Flathead River. The act also authorizes an irrigation development in the vicinity of Kalispell, Mont.

BUREAU PREPARING VETERAN SETTLEMENT LEGISLATION

Drafting of legislation which would make homesteads available on Reclamation projects for returning servicemen after the war, in con-

junction with the Bureau's postwar construction program, was well advanced at the end of the fiscal year. Under tentative plans, the settlement program would be handled by the Department of the Interior in cooperation with the agencies that are charged directly with the administration of veteran affairs. The Bureau's legal staff is engaged in preparing a report on and drafting amendments to H. R. 3179, introduced by Congressman Murdock of Arizona, which would provide opportunities for veterans to reestablish themselves on irrigated farms.

SEEK TO AMEND PROJECT ACT OF 1939

Pending before Congress was legislation which would amend Sections 4, 7, and 17 of the Reclamation Project Act of 1939. The principal objective of the bill, reported out by the Senate Committee on Irrigation and Reclamation, is to extend the time within which amendatory contracts may be made to December 31, 1950, or 5 years after the end of the war, whichever period is the longer. With additional personnel available in the postwar period, it is expected many amendatory contracts can be negotiated. Relief provisions of the Act would also be extended by the measure.

BUREAU DECENTRALIZATION EFFECTUATED

Decentralization of the Bureau of Reclamation through the establishment of six regional offices and five administrative branches in Denver, Colo., the objective of which was to "streamline" the organization for greater efficiency in meeting war and postwar problems, was effectuated during the fiscal year.

Six outstanding Bureau officials were placed in charge of each region as Regional Directors of Reclamation, and five others, experienced in their respective fields, were named to head the branches. These are: Design and Construction, Project Planning, Operation and Maintenance, Fiscal and Administrative Management, and Power Utilization. Regional offices were established in Boise, Idaho; Sacramento, Calif.; Boulder City, Nev.; Salt Lake City, Utah; Amarillo, Tex.; and Billings, Mont.

The Regional Directors are responsible for coordinating all Bureau activities within their regions, and they report directly to the Commissioner. They have extensive latitude for independent action. Assistance in technical phases of their work is provided by the Branch heads.

On the basis that the improved organization would provide added protection of the Federal investment in irrigation and multiple-purpose projects, and that it was essential because of the Bureau's greatly expanded activities, nonreimbursable funds were sought for the cost

of administration, without success. Further efforts to obtain these funds will be made in fiscal year 1945, with continued emphasis to be placed on the fact that the decentralization extends a significant portion of the Commissioner's function (the cost of which is nonreimbursable) to the field.

Military furloughs, resignations, and transfers reduced the number of Reclamation employees from 6,543 on June 30, 1943, to 6,513 on June 30, 1944. Twenty-one Washington employees and 1,643 field employees were in the armed forces of the United States. Twelve have given their lives and 2 are missing.

The number of persons employed in the various Bureau activities were: Commissioner's office, 98; branch offices (Denver Colo.), 820; legal office (Denver), 13; Region 1, 1,733; Region 2, 833; Region 3, 1,050; Region 4, 312; Region 5, 1,109; Region 6, 545.

During the year the number of field offices, exclusive of headquarters for project planning work, was reduced from 54 to 50.

COMMISSIONER AND TWO ASSISTANTS APPOINTED

Harry W. Bashore, Assistant Commissioner of Reclamation since May 27, 1939, and for more than 37 years a Bureau employee, took office as Commissioner on August 3, 1943, upon appointment by the President. He replaced John C. Page, who resigned in June 1943 because of ill health. Mr. Page had served as Commissioner since January 25, 1937.

Secretary of the Interior Harold L. Ickes appointed two Assistant Commissioners during the year; namely, William E. Warne, former Chief of Information for the Bureau, and Kenneth Markwell, former Regional Director of the Federal Works Agency. Mr. Warne took office on August 9, 1943, and Mr. Markwell on April 18, 1944.

RECLAMATION FUND ACCRETIONS

In the 42 years of the Bureau's history, the accretions to the Reclamation fund have totaled \$220,910,306.02. (See table 4.) These have come from the sale of public lands, proceeds from the Oil Leasing Act, from Federal water power licenses, potassium royalties, and rentals and receipts from Naval petroleum reserves from 1920 to 1930 under the act of May 9, 1938. Collections—construction and operation and maintenance repayments, water rentals, power revenues, etc.—have totaled \$159,748,056.18.

Disbursements during that period have totaled \$349,523,020.29, leaving a balance in the fund on June 30, 1944, of \$31,135,346.91. Repayments of construction charges to the Reclamation fund during the fiscal year 1944 totaled \$400,000,000. Operation and maintenance collections amounted to \$1,400,000, and water rental, power, and other receipts aggregated \$6,000,000.

The total collections reflect the improved financial condition of Reclamation farmers and their continued response to the President's anti-inflation policy by maintaining a good record of repayments. The high level of the Reclamation fund provides resources for the extension of irrigation investigations and for the extension of irrigation systems when the resumption of construction is possible.

TABLE 4.—*Accretions to reclamation fund by States*

	Sale of public lands		Proceeds from Oil Leasing Act		Total to June 30, 1944
	Fiscal year 1944	To June 30, 1944	Fiscal year 1944	To June 30, 1944	
Alabama.....			\$31.76	\$197,635.78	\$197,635.78
Arizona.....		\$2,766,339.36	1,197.65	7,501.60	2,773,840.96
California.....		8,304,067.54	1,473,572.47	23,195,923.94	31,499,991.48
Colorado.....		10,326,330.20	131,696.11	1,236,483.51	11,562,813.71
Idaho.....		7,058,097.58	63.01	22,437.94	7,080,535.52
Kansas.....		1,033,601.40	596.24	10,803.06	1,044,404.46
Louisiana.....			9,454.01	342,050.77	342,050.77
Michigan.....			1,010.36	1,066.81	1,066.81
Mississippi.....				110.25	110.25
Montana.....		15,388,624.90	156,372.30	1,788,360.91	17,176,965.81
Nebraska.....		2,097,698.70	21.00	351.75	2,098,050.45
Nevada.....		1,042,345.90	8,541.57	14,733.55	1,057,079.45
New Mexico.....		6,742,810.30	747,809.95	4,966,805.38	11,709,615.68
North Dakota.....		12,219,646.27	18,856.49	278,050.99	12,497,697.26
Oklahoma.....		5,931,145.58	1,157.75	8,327.07	5,939,472.65
Oregon.....		11,995,324.73	98.30	1,055.58	11,996,380.31
South Dakota.....		7,733,675.48	5,529.35	24,826.07	7,758,501.55
Utah.....		4,397,539.48	162,673.69	1,204,669.49	5,692,208.97
Washington.....		7,475,102.22	1,296.25	45,270.96	7,520,373.15
Wyoming.....		8,722,080.55	1,178,712.22	41,822,755.37	50,544,835.92
Total.....		113,234,430.19	3,898,780.48	75,259,220.78	188,493,650.97
Proceeds, Federal water power licenses.....					1,960,590.96
Proceeds, potassium royalties and rentals.....					2,167,763.96
Receipts from naval petroleum reserves, 1920 to 1938, act of May 9, 1938.....					29,778,300.23
Grand total.....		113,234,430.19	3,898,780.48	75,259,220.78	220,910,306.02

¹ Proceeds for fiscal year, \$33,282.98.² Proceeds for fiscal year, \$286,298.75.

FEDERAL INVESTMENT EXCEEDS \$900,000,000

The Federal investment in Reclamation since June 17, 1902, when the Reclamation law was approved, topped the \$900,000,000 mark in 1944. Expenditures for construction on all projects during the 12-month period totaled \$51,665,144.79, bringing the total Federal outlay under Reclamation to \$921,770,619.71. (See table 5, p. 34.)

Despite the war restrictions on materials and manpower, progress was made on the construction of irrigation systems under the war food program. While clearances from the War Production Board were not available sufficiently early in the fiscal year to complete war food schedules as planned, the Bureau of Reclamation was able to lay the groundwork for more rapid construction during the fiscal year 1945 and 1946.

The funds available for advancing power installations under the war power program enabled the Bureau to increase substantially not only the Federal investment in power facilities on reclamation projects, but to provide facilities, through additional storage and generating equipment, that are providing revenues for assisting in financing the cost of irrigation systems.

The importance from a financial standpoint of the power installations on Reclamation projects is illustrated by preliminary studies which indicate that about 50 percent of the repayable costs of the entire reclamation construction program as laid out at the beginning of the war, will come from power revenues. Approximately 45 percent of these costs will be repayable by irrigation water users, and the remaining costs will be allocated to nonreimbursable purposes such as flood control, navigation, and contributed labor, or will be repayable by municipalities for supplemental water supplies.

The Congress appropriated \$18,907,200 for construction of irrigation facilities during the fiscal year 1945. The total unexpended balance for construction purposes of all kinds brings to \$80,628,000 the total funds available for this activity by the Bureau of Reclamation during 1945.

Control over the construction of irrigation, power, and other facilities remained in the hands of the War Production Board. Construction of irrigation facilities is recommended to the War Production Board by the War Food Administration, and the construction of power facilities is subject to the direct consideration of the War Production Board.

Division of Power

ARTHUR GOLDSCHMIDT, Director



AFTER the war the problem of how to cope with abundance will beset our economy all along the line, and unless it is solved, will threaten the development of vital irrigation and flood control works dependent upon the Midas touch of power. Power facilities that were hastened to completion for war production must not remain idle to block further multiple-purpose water conservation needed throughout the Nation. Hydroelectric power cannot stagnate without dire results any more than manpower can. If it is unemployed the men and the capital that it supports will be unemployed also.

The country expects this Department to take the initiative in averting such a catastrophe, and quite naturally. We operate the largest aggregate of hydroelectric capacity in the world. We also market power which is generated at dams that are operated by the United States Army Corps of Engineers. The generating plants from which the Department of the Interior markets power produced 17.6 billion kilowatt-hours of energy during the fiscal year, as compared with 12 billion kilowatt-hours last year. As the year ended the total capacity of Department plants in operation amounted to 2,795,000 kilowatts. Other units now being tested will increase this total to more than 3 million kilowatts—an amount of energy sufficient to supply three cities the size of greater New York. And the Rivers and Harbors bill and the Omnibus Flood Control bill, both pending, would authorize the Secretary of the Interior to market, in addition, all the excess power which would be generated by these new projects that are to be constructed by the War Department.

Consequently, this Department has prepared to undertake the task of employment agent to find jobs for power after the war. The job can be simply stated, but it is not simple. We know that a lot of power will be needed in the West, but power works under contract, and in order to prepare for contracts we must know accurately how much power is to be delivered, and precisely where. Approximately how much and

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approximately where within half a continent will not do. And the answer to these questions depends on the answers to innumerable others that stem from one big question—what kind of world will the postwar world be? How can more power be employed on the farm, in the home and in the factory? How fast will we fill back orders for such familiar things as radios and refrigerators? What now-unfamiliar things will become as commonplace as bathtubs? What will these necessities be made of? From what base will we extract the raw material? At what rate will they be manufactured? How will altered transportation practices affect certain sections? These and a book-length roster of other questions must be answered before we can know where there will be jobs for power, and for how much power, after the war.

Numerous inquiries have been launched in an effort to acquire the needed information. The power selling agencies of the Department have pursued some of our studies in collaboration with other Federal agencies, or with State or municipal research organizations. We do not pretend to have found the unalterable answer to many of our questions, but our inquiry has been profitable because we have found some reliable clues to what the answers will be when they are found, and we have placed ourselves in a position to be among the first to get the facts when they are established. Also, our work has done more than merely provide guidance for the Department. We have given much assistance to industries, power distributors and to congressional committees and to individual members of Congress.

Among the post-war power planning activities of the Department in which the Division has participated are the following:

General.—The Division has worked with the war agencies on the problem of disposition of war power plants. Some of the large military establishments, constructed during the last few years, have been so located or have required electric power in such quantities that it has been necessary to provide fuel-operated generating plants to serve them. During the past year the Division has initiated discussions regarding the acquisition by the Federal power agencies of those plants which the armed services will not need after the war, as a means of supplementing and firming the power which is now generated at federally owned plants. Such coordination of Government facilities will result in better operations, sounder financial arrangements and lower rates. In many instances such fuel-operated plants can provide needed peaking or standby power which is now being purchased by the Government.

Central Valley project.—The Division participated in studies being conducted by the Department to work out the pattern for the administration and the extension of the multiple-purpose development in the Central Valley and to determine the best method for making available to the people of California its maximum benefits at a minimum cost.

Members of the staff participated, as committee members, in the discussions and studies of 13 of the 24 problems into which the study was divided. These problems included the use of Shasta power for war production, the scheduling of construction features, the reconversion of war plants in the area, the extension of the project to provide additional post-war opportunities, the allocation of cost on the project, and the power policies to be effectuated. Some of the reports resulting from these studies were completed during the year.

Missouri River development.—The Division reviewed programs for the development of the resources of the Missouri River Basin, prepared by the Bureau of Reclamation and the Corps of Engineers, and undertook independent studies looking toward the coordination of the several interests involved in this development. The problem of a unified development on this major stream is being given close consideration.

Pacific Northwest.—The Division participated in discussions and reviewed proposals regarding further development of the Columbia River and its tributaries. These efforts cover the economic development of the area as well as proposals directly concerned with specific river structures, and have as their objective the establishment of a diversified industry as the basis for a more self-sustaining and self-reliant region following cessation of specialized war activities. The Director of the Division, representing the Secretary of the Interior on the Bonneville Advisory Board, participated in the consideration of the problems of securing upstream storage on the Columbia and in the review of the studies of the Administration with respect to the development of industrial opportunities in the Northwest.

Colorado River area.—The Division engaged in a study of the further development of the Colorado River, and of the opportunities for marketing additional power in Arizona to assure this State its share in the resources of this stream, integrated with development of the Pacific Southwest as a whole. Studies of the relationship between the Salt River Valley Water Users' Association of Arizona and the United States and its effect upon post-war marketing possibilities were made in cooperation with the Bureau of Reclamation. The studies included the possibility of integrating these power facilities with the Colorado River power plants to produce a unified operating system, and make possible lower power rates.

ESTABLISHMENT OF SOUTHWESTERN POWER ADMINISTRATION

The work of the Division of Power, which is charged with supervising and coordinating all of the power activities of the Department, continued along the lines that have been dictated by the market-

ing problems resulting from increased tempo of war operations, as well as the concern for post-war conversion and expansion.

The principal work in the field of operations which confronted the Division during the year was the establishment of the Southwestern Power Administration. This agency was created along the lines of the Bonneville Power Administration to market power from dams in Arkansas, Texas, and Oklahoma. By Executive orders of the President, under his war powers and as a war measure the Pensacola Dam of Oklahoma's Grand River Dam Authority, previously taken over by the Government under the Federal Power Act, was turned over on September 1 to the Department of the Interior for operating purposes, and the Department was also designated as the agency to market the power to be generated at the Norfolk and Denison multiple-purpose dams, then rapidly being completed by the Corps of Engineers of the United States Army. The initial installations at these three dams total 130,000 kilowatts. They may ultimately have a combined total capacity of 320,000 kilowatts. The task of setting up the Southwestern Power Administration was undertaken directly by the Division of Power, which handled negotiations with other Federal agencies, helped to formulate basic policies and operating procedures, reviewed recommendations for key personnel, supervised the preparation of operating budgets, accounting procedures and negotiations and reviewed contracts for the sale of power from the three dams.

RATES AND RATE SCHEDULES

Rural Electrification Administration financed projects.—Rural residents served by Rural Electrification Administration financed power distributing projects have been benefited by the rapidly growing power developments of the Department through the availability of abundant power at low rates. Thirty-seven Rural Electrification Administration financed distributing agencies are being supplied directly with energy from facilities under the supervision of the Department at rates ranging down to 2.7 mills a kilowatt-hour.

Reduction in rates to these units, made possible by direct service from Department plants, have ranged from 3 to 27 percent in the case of four projects in the Wyoming-Colorado area, and from 15 to 20 percent in the case of those projects which were served by the Bonneville Power Administration. In addition, one of the conditions of the sale to a private power company in Texas of power from the Denison Dam assured the continuation of low rates to fifteen Rural Electrification Administration projects that are served by that company as long as the Denison power is available.

General.—Recent major rate studies reviewed by the Division included those covering proposed rates for power from Fort Peck Dam, the general rate revisions of the Bureau of Reclamation covering its Wyoming installations, the establishment of an irrigation pumping rate in Arizona by the Bureau of Reclamation and the establishment of new rates by the Bonneville Power Administration. Current studies include possible additional rates for industrial purposes by the Bonneville Power Administration and rates for the sale of power from the Denison and Norfolk projects by the Southwestern Power Administration.

CONTRACTS

Important contracts for the sale of power are reviewed by the Division before execution, in order that a uniform Departmental policy with respect to power sales may be maintained. Although the Division does not generally participate in the negotiations of power contracts, the services of the staff of the Division are made available to the negotiating agency in special circumstances. For instance, during the year the staff of the Division has participated in negotiations of the Bureau of Reclamation (*a*) for the sale of Central Valley project power to the Pacific Gas & Electric Co. as a wartime measure, (*b*) for the sale of Fort Peck project power to the Montana Power Co. as a wartime measure, (*c*) for the sale of Fort Peck project power to the Montana-Dakota Utilities Co. on a long-term basis, and (*d*) negotiations by the Southwestern Power Administration for the sale of power from the Denison Dam to the Texas Power & Light Co. as a wartime measure.

MISCELLANEOUS

The Division took an active part in determining the allocation of the costs of the Grand Coulee Dam among the several purposes for which the project was built. The allocation of these costs is an essential prerequisite to the determination of the rates at which the power from Grand Coulee will be sold.

Through the work of the Division in cooperation with the agencies of the United States that are consumers of power and with the Federal Power Commission the Department was able to help in obtaining substantial savings in power costs to the Government in a number of instances during the year. For example, by temporarily supplying 9,000 kilowatts of power from the Grand River Dam to the Government-owned aluminum plant at Jones Mills, Ark., a substantial saving to the Government was realized.

The Division was also able to render service to the Puerto Rico Water Resources Authority in connection with its priorities problems in the construction of the Caonillas Dam, a necessary link in the

power system that supplies military bases in Puerto Rico. Assistance was also given to the Territorial Government of the Virgin Islands in connection with the power supply for Benedict Field, and to the Oklahoma Ordnance Works, through the Southwestern Power Administration, in connection with the supply of power to that establishment.

The Division continued to participate in the activities incident to safeguarding the national power supply, including consideration of the need for a dim-out and other measures in the interests of conservation of resources for war.

Bonneville Power Administration

PAUL J. RAVER, Administrator



I. WAR AND PEACE

FEDERAL development of the tremendous water resources of the Columbia River was conceived by the Seventy-fifth Congress as a peacetime project for conservation and utilization of Pacific Northwest resources. During wartime, this program has been modified to meet the requirements of the Nation's first and biggest job—that of mobilizing its resources to win the war.

Under the impact of war the Bonneville Power Administration has telescoped 10 years of normal growth into a brief 5 years. It has delivered 6,472,326,000 kilowatt-hours for war needs during the fiscal year 1944, and has become one of the three largest power systems in the country, with a present energy output of approximately 10 billion kilowatt-hours per year. It has constructed a high-voltage, high-capacity transmission system which has grown from nothing in 1939 to 2,518 circuit miles as of June 30, 1944, involving an investment of about \$75,000,000. This system is marketing power from Bonneville-Grand Coulee generators which have increased in rated capacity from less than 100,000 kilowatts in 1939 to 1,316,400 kilowatts in 1944.

This forced growth has been possible largely because of the Administration's policy of developing Northwest power resources well in advance of immediate demands or specific markets. The value of this policy has been demonstrated time and again during the war emergency as mushrooming industries have steadily increased their production of critically needed war materials with Bonneville-Grand Coulee power.

During the fiscal year 1944, 5 Northwest aluminum reduction plants used Columbia River power in the production of nearly 600 million

pounds of aluminum, or approximately one-third of the Nation's entire output. Part of this aluminum ingot took final form in approximately 30,000 airplanes—again almost one-third of the entire national production for the year. Bonneville-Grand Coulee power was instrumental in turning out 258 ships, including 48 escort carriers, 62 tankers and fleet oilers, 32 Victory cargo ships, and 116 Liberty cargo ships. Less spectacular, but equally important, was the output of magnesium for planes and incendiary bombs, calcium carbide for ship welding, and ferrosilicon for steel—all from plants using Columbia River power. Thus, the Bonneville Power Administration has made a significant contribution to the Nation's ability to produce, a factor which has been vital to the work of winning the war.

Hydroelectric power from the Columbia River has established its right to be termed one of the Nation's most powerful tools of war production. It will play an equally vital role in the post-war development of the Pacific Northwest as a tool for the production of national and regional wealth. The power that today is flowing from Bonneville and Grand Coulee power plants over a vast region-wide network of high-tension transmission lines to huge war plants, will turn the wheels of the region's expanding industrial empire when the war is won.

With Allied victories on every battlefield during the past year casting a growing shadow of complete and devastating defeat over Axis hopes of world domination, attention began inevitably to shift from war to post-war problems, even while the Nation still was engaged in full war production. In the Pacific Northwest post-war thinking and planning has been dominated by a growing realization of one fundamental fact—the vast hydroelectric power resources of the Columbia River Basin hold the key to the future development of the region.

THE CONSERVATION PROGRAM

Multiple-purpose dams on inland waterways of the Nation are a most important means of carrying out the Federal Government program of conservation of natural resources. Bonneville Dam provides the means for impounding and controlling the waters of the Columbia River so that the river can be navigable for oceangoing vessels 180 miles inland, thus reducing transportation costs, prices for many products, and opening new markets for products of the Pacific Northwest. Behind Grand Coulee Dam is stored water for the reclamation and irrigation of 1 million acres of arid but fertile lands. Electric power produced at these Columbia River power plants further utilizes the inexhaustible water resources of the region by converting them into an energy form useful to the people for the production of more goods and

services to improve living standards, and to conserve other sources of energy, such as coal, wood and oil, which are subject to depletion and which should be conserved as much as possible for higher economic uses.

In carrying out these peacetime conservation policies, electric power produced at Bonneville and Grand Coulee Dams must first be used to meet the requirements of navigation, flood control, and irrigation. The remaining surplus power is marketed by the Bonneville Power Administration according to the basic policies laid down by Congress in the Bonneville Project Act of 1937.

REGIONAL LEADERSHIP

Since the enactment of these policies, the Bonneville Power Administration has worked toward and attained a position of recognized leadership in the development of the Pacific Northwest. The Administration in its 7 years of growth has fostered and encouraged Federal and State cooperation in the programming of regional developmental activities.

One of the most significant steps in this direction in the fiscal year 1944 was the formation on July 19, 1943, of the Northwest States Development Association, which is composed of the Governors of Idaho, Montana, Oregon, Washington, and Wyoming, and is aided by a technical committee of people responsible for the engineering and general planning functions in these States. The purpose of the Association is to further the balanced development of the Pacific Northwest and the Columbia Basin, with special emphasis on maximum utilization of the water resources of the region through irrigation, improved navigation, hydroelectric power development and flood control.

In its initial meeting the Association resolved that " * * * it shall be a further duty and responsibility of the Association to avail itself of the services and facilities of governmental, private and public agencies to the end that duplication of effort and consequent wasteful expense shall be avoided in the making of studies, the programming of activities and the carrying on of research."

Emphasizing the importance of the Pacific Northwest as a nerve center of industrial and commercial contact with the tremendous potential markets of the Far East, the association's initial report on a Columbia Basin program states: "It is believed that the rapid advance in Northwest development and production must continue. This advancement must be supported by a progressive and dynamic regional and national post-war reconstruction program. Post-war progress on the Pacific coast and in the basin will be especially great if the national reconstruction program is accompanied by world cooperation and trade. Confidence in the Northwest and its future are based on its geographic location, its great resources, and its people.

"The basic development projects of the Pacific Northwest—began before the war—have paid tremendous dividends in the war effort. They will continue to pay dividends after the war. The present stage of development is not sufficient to meet either war or post-war needs; continuing and progressive development is necessary."

THE REGIONAL PLAN

Following general endorsement by the Department of the Interior of the Bonneville Power Administration's proposals for a basin-wide program, representatives of the Administration met with the Five State Governors' Association and presented its program for consideration. This program included the Hungry Horse project in Montana, the Cabinet Gorge and Albeni Falls projects in northern Idaho, the Foster Creek and Snake River projects in Washington, the Umatilla Dam on the Columbia River and the Detroit project in Oregon.

On December 17, 1943, the Association issued its advance program report, which included all of the projects recommended for consideration by the Bonneville Power Administration, as well as a number of additional projects involving irrigation, navigation, and flood-control improvements. The program involves a total expenditure of approximately \$600,000,000 in war emergency and post-war projects.

Gearing its own plans to the multiple-purpose projects outlined in the Five-State Governors' report, the Bonneville Power Administration set up an advance construction program involving approximately \$100,000,000 in new transmission lines and substations designed to coordinate existing and proposed dams and load centers in a region-wide transmission grid system.

In round figures the combined programs outlined by the Northwest States Development Association and the Bonneville Power Administration will add about 1 million acres to the 3½ million acres of land now under irrigation in the region, and will provide improved water supplies for several hundred thousand more. It will increase regional power capacity by about 2 million kilowatts—adding about 60 per cent to the total regional capacity through new plants and upstream storage. The combined effects of the program will be broader and more diverse development; the establishment of new industries; new opportunities for employment—for business—for private and public enterprise and for investment.

In addition to increasing materially the real wealth of the region and the Nation, the program will have the effect of bringing about a greater maturity in the Northwest regional economy, particularly through a more advanced development and use of resources, as well as supplying a base for substantially larger population. It follows that public investment will induce at least as much more wealth—in

land, improvements, plant and communities—a prospective increase of some \$1,500,000,000.

PUBLIC WORKS AND REEMPLOYMENT

The immediate post-war program of asset-building, self-liquidating public works will produce some 50,000 construction jobs for returning servicemen and demobilized war workers. In operation the program will produce more than 100,000 continuing new jobs in agriculture, industry, and service, with an accompanying increase of some \$200,000,000 in annual income for the region. A program of the kind suggested will conceivably provide, if continued during the next 2 decades, a base for new regional population of at least 2 million. This will mean, averaging 4 persons to the farm home, 200,000 people on 50,000 new farms; 800,000 people dependent upon 250,000 new industrial jobs, and approximately 1,000,000 people dependent upon 350,000 new service jobs.

Testimony presented by the Bonneville Administrator before the Senate Committee on Postwar Economic Policy and Planning and before the House Committee on Irrigation and Reclamation during the past fiscal year outlined clearly the Administration's fundamental status as a regional developmental agency. Both reports stressed the importance of a balanced and unified program of development in the Columbia River drainage basin as one of the major factors in providing for maximum postwar employment in the Pacific Northwest.

In accordance with the Presidential Executive Order 9384 of October 4, 1943, and to facilitate and coordinate Bonneville Power Administration consideration of a unified advance program, a special committee on advanced planning, programming, and budgeting was formed within the Administration on November 20, 1943. The functions assigned to the committee were the coordination of the Administration's programs and plans with various governmental and regional interests, effectuating necessary technical staff assignments, review and coordination of data and reports prepared by the staff in accordance with such assignments, and presentation of unified recommendations to the executive committee of the Bonneville Power Administration for consideration and review.

The advisory committee was directed to place particular emphasis upon the formulation of unified basin-wide power system development plans for both the wartime and the post-war period. The committee was also directed to give particular attention to the coordination of the administration's advance plans and programs with those of other agencies of the Department, as well as other Federal, State, and local governmental agencies and interests.

During the fiscal year 1944, the committee has successfully brought together those concerned in various advance programming efforts in

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the joint consideration of system extension projects; a long-range system development program and a 3-year and a 6-year advance construction program. The committee has also made preliminary studies for the potential use of surplus war materials, equipment and plant by Bonneville Power Administration, public power distributors and industries in the region.

PACIFIC NORTHWEST OPPORTUNITIES

Closely related to the committee's work and a significant contribution to advance regional planning was the publication by the Bonneville Power Administration of the Pacific Northwest Opportunities report. The report, although of a preliminary nature, presented comprehensive flow charts and detailed information on a wide variety of industrial and agricultural possibilities in the Pacific Northwest, together with pertinent comment on raw materials, power supply, and geographical particulars.

Publication of the report met with immediate and widespread acclaim. Nation-wide press comment, as well as complimentary letters from leaders of industry and business, educators and other professional people, members of Federal, State, and local governmental agencies, indicated that the report was not only filling an urgent need for information of this type on the Pacific Northwest but was serving as a definite stimulus to interest in the potentialities of the region.

Pointing out the purpose of the report as well as the purpose of the Bonneville Power Administration program, the preface of the report says: "The underlying aim for the whole region and for all the agencies that serve it is to create a stronger and better balanced economy by raising it further from its status of a mere colonial producer of raw materials. The wastefulness of unused rich resources must be changed to wealth, productively used. The wantonly expensive system of shipping raw materials 3,000 miles east and resulting finished products 3,000 miles back to the west must be eliminated. A more reasonable economy will, it is hoped, result from this study, from similar studies by others and by construction programs."

Referring to the place of power in the program, the preface states: "Hydroelectric power is an outstanding resource in the Pacific Northwest. It is a product of the river-development project. It is the means of enlarging the benefits of all the other phases of the project. It is, besides, the principal key to the development and use of other regional resources. Power irrigation and drainage pumping facilitates reclamation. Power widens the usefulness of both farmer and crops to an indefinite horizon. Power draws minerals from the earth; becomes an essential ingredient in electro-manufacturing and cuts down the cost of other manufacturing. Power supplies terminal, storage, and distributing service in commerce. Power fosters the growth of

many diverse industries and, available everywhere, distributes them throughout the region. Power raises the level of living in city and country. Power is the invisible magic that flows in abundance from river development and leads to regional development."

Further presenting the value of the relationship of various programs and the need for cooperation, the preface says: "Both power development and regional development, so closely related, are matters of deep concern to a number of Federal agencies, States, communities, and private enterprise. All plans must be formulated on a joint or cooperative basis if they are to be comprehensive and realistic. This presentation of a Bonneville Power Administration program could hardly be complete or clear without some indications of other closely related programs for regional development. Similarly, the programs of other agencies cannot be complete or clear without recognition of the related power program of Bonneville.

All the basic plans must be brought together and properly correlated and the interest and enthusiasm of all agencies must be assured for a really effective program for regional development.

The report offers a constructive contribution to regional planning and development programs for future transition from the current war period to peace.

Several sections are devoted to the industrial opportunities offered in the fields of railroad electrification, farm utilization of power, electric steam generation, and electric house heating. In addition to the manufacturing and distribution possibilities offered, each of the foregoing represents a considerable power load building potential.

ADVANCE MARKETING STUDIES

Continuing studies are being carried on to elaborate the material contained in the report. As an example, tests and investigations of electrically heated houses were participated in throughout the year by the administration's utilization staff. Activities were centered at Longview, Wash., where a substantial number of privately-owned homes have been successfully heated by electricity for the past 3 years. During the calendar year 1943 an average of 11,000 kilowatt-hours of energy costing \$73 per home was consumed for heating service in the Longview homes. Information gathered at Longview and submitted to the U. S. Army Engineers was the basis for selection of electric heat for another project of 1,800 houses in this region. The reduction of war loads will stimulate activity by power distributors to expand the domestic market, and facts indicate that electric house heating will triple annual domestic energy consumption. It is estimated that 25,000 houses should be electrically heated in this region within 10 years, representing a heating load of approximately 125,000 kilowatts and marketing 275 million kilowatt-hours annually. Negotiations

have been carried on during the year with the War Production Board to release the materials for electric heaters to be used in new permanent-type houses in the Northwest.

FUEL CONSERVATION

The possibilities discussed in the report for the use of hydroelectricity in the generation of steam as a fuel-oil replacement have passed the study phase and are approaching commercial reality. The markets opening for the sale of power for this use have been vastly accelerated by the requirements for fuel oil in the prosecution of the war.

A major user of fuel oil for steam generation for some time has been the pulp and paper industry, although other and smaller industries are now consuming increasing quantities due to the depletion of other forms of fuels. The estimated amount of heavy fuel oil consumed in Washington and Oregon alone during fiscal 1944 was 13 million barrels. Of this, some 440,000 barrels were consumed in power generation by electric utilities, leaving a balance of approximately 12,790,000 barrels consumed by industry. In heating value 440,000 barrels is the equivalent of 15,400,000 kilowatt-hours. War's demands, higher production cost, and the expanding use of oil as a raw material for manufacture are all factors tending to bring steam generation by means of electric boilers into close competition with other forms of heat production. This is especially true when consideration is given to the substantial amounts of secondary power available which can be sold at a lower cost than is provided by the Bonneville firm power wholesale rate of \$17.50 per kilowatt-year. Based on recent inquiries of the pulp and paper industry and data collected from field investigations, it has been estimated that if all present oil consumption by this industry for the generation of processed steam were replaced by electric power, a market of 450,000 kilowatts of secondary power would be created.

As the foregoing examples indicate, it becomes obvious that wider use of hydroelectricity for domestic and industrial heating purposes as well as for such power consuming purposes as railroad electrification will induce substantial savings in exhaustible wood, coal, and oil supplies, for which science is constantly finding new and higher uses.

CUT-BACKS AND CONVERSION

Late in December 1943 the Administration began to be confronted with threatened cut-backs in production of the northwest war industries it was serving, particularly in the case of aluminum plants. These cut-backs emphasized the need for immediate provision for additional advance marketing studies, in order to be better prepared for remarketing power released by war industries when curtailments occur. The Administration's 1945 budget had been prepared on the assumption that the war would require full war production throughout the fiscal

year 1945. However, some curtailments in production began in December 1943 and as yet no action had been taken on the advance planning budget, which provided for marketing studies to meet situations of this nature. It was concluded, after consultation with representatives of the Department and endorsement by the Bonneville Advisory Board at a meeting held on March 9, 1944, to present an immediate request to the Bureau of the Budget and the Congress for a supplemental appropriation for this purpose to be added to the administration's 1945 fiscal year budget.

The Bureau of the Budget and the President recommended a supplemental appropriation for this purpose of \$254,000. While this recommendation did not reach the House in time for action on the measure, the House committee had indicated general sympathy to the proposal and after hearings the Senate committee and the Senate approved addition of this amount to the 1945 budget. However, in conference the amount was compromised and the sum of \$127,000 was finally approved for this purpose.

In addition to endorsing the supplemental appropriation for advance marketing studies, the Bonneville Advisory Board at its meeting of March 9 recommended reinstatement of priorities for Grand Coulee Unit No. 7 and endorsed the general program for upstream storage development as worked out with the States of Idaho and Montana. Proceedings of this meeting reiterated in large part the findings of the Advisory Board at its earlier meeting held October 11 and 12, 1943.

REGIONAL ADVISORY COUNCIL

Another major development of the year was a decision to proceed with appointment of a group of regional consultants with whom the Administrator could confer regarding regional policy and the developmental program. Arrangements were finally completed for designation of the regional consultants with the endorsement of the Secretary of the Interior and the Advisory Board. The first meeting of the group, comprising 20 regional consultants from the 4 States of Oregon, Washington, Idaho, and Montana, was held in Portland on March 31, 1944.

A general program report was presented by the Bonneville staff outlining the objectives of the Administration and the plans suggested for developmental activity. The remainder of the meeting was devoted to review and critical study of the Pacific Northwest Opportunities report.

A second meeting of the group was held on June 5 and 6, at which time such specific phases of the program as industrial load building and electric house heating were discussed. It was determined that extension of the consultant's deliberations might be carried on by

smaller groups in the localities represented and their findings as subjects for discussion at periodic meetings of the major group.

II. SHIFT FROM CONSTRUCTION TO OPERATIONS PROGRAM

The fiscal year 1944 marked a turning point in the history of the Bonneville Power Administration. After 7 years of intensive construction activity the Administration had completed a basic transmission grid system comprising more than 2,500 miles of high voltage lines. During the year the Bonneville powerhouse was brought to completion by the United States Army Engineers with the addition of generators 9 and 10, and the sixth, seventh, and eighth generators were installed by the Bureau of Reclamation in the west power house at Grand Coulee Dam.

With completion of these major generating and transmission facilities, and with further construction, excepting certain emergency projects, curtailed by the war, there has been a sharp swing toward operating, research and marketing phases of the Administration's activities. Rapid expansion of facilities to meet the needs of war industries, the steady and accelerating demand of the armed forces upon personnel, and other exigencies of the emergency made it necessary to maintain great flexibility within the Administration. Its adaptability to quickly changing conditions became a real necessity. Toward this end a general realignment of the Bonneville organization was effected by Administrative Order No. 59, dated November 4, 1943.

ADMINISTRATION REALIGNMENT

The order gave organizational emphasis to the power system operations by establishing a Division of Operations and Maintenance. It formerly was one of five sections in the Engineering Division, combining the remaining four sections of the former Engineering Division into a Division of Engineering and Construction. Both divisions are now included in the Branch of Engineering and Operations, under the supervision of the chief engineer. The new strong, efficient engineering organization, streamlined and adapted to the major tasks of operations, maintenance and construction which lie ahead.

Similarly, the former Market Development section, which was one of five sections in the System Planning and Marketing Division, was advanced in status to the Division of Industrial and Resources Development. Other functions of the former marketing division were combined in the Division of Power Sales and Service. The new divisions, which are figuring importantly in preparations for war activities, are included in the Branch of Power Management.

A new Branch of Fiscal and Administrative Management was established under the supervision of a controller to embrace a Division of Finance and Accounts, including all budgetary, financial, and accounting functions, a Division of Administrative Services to embrace service functions, and an Organization and Procedure Staff to conduct management studies.

Finally, the executive committee, composed of the branch managers, general counsel, and administrative staff, was formally established to guide and coordinate matters of policy and programming, with responsibility for current administration being delegated largely to the branch and division chiefs.

The new plan of organization was resolved through analyses made by staff members of the administration in cooperation with members of the Department of the Interior, taking into consideration the three-fold nature of the Bonneville Power Administration as an operating utility, a government business organization and a regional service agency.

III. WARTIME OPERATIONS

During the fiscal year 1944, maximum hourly generation supplied by the Bonneville and Grand Coulee plants was 1,355,000 kilowatts as contrasted to 841,000 kilowatts during fiscal year 1943.

The comparison is indicative of the pressure of regional war needs on the administration's transmission system. As the war has progressed it has become necessary to operate all facilities at capacity, and in many instances with heavy overloads, to supply these needs. For example, the Grand Coulee generators have operated continuously for extended periods of time with approximately 20 percent overload and Bonneville generators with approximately 10 percent overload. During the greater part of the year both plants have operated without reserves.

The low water months of this year marked the first period when the entire flow of the Columbia River was utilized through the Bonneville generators. From September 14, 1943, until April 5, 1944, with minor exceptions of a few hours' duration, no water was spilled at Bonneville Dam. During this period, too, the natural flow at Bonneville was augmented, in amounts as high as 28,000 second-feet, by storage water released from Grand Coulee Reservoir. Although the scheduling of such releases was vastly complicated by conditions along the river which affected the arrival time and quantity delivered over wide limits, the operation was highly successful in increasing the generating capability of the Bonneville plant and relieving the necessity for transmitting large blocks of Grand Coulee power over lines that were already heavily loaded.

WARTIME POWER LOADS

Transmission facilities, also, have operated at capacity throughout the year, and in a number of instances, under conditions of extreme overload. A noteworthy example is the No. 1 Covington-Coulee 230,000-volt line which has carried, for weeks at a time, over 210,000 kilowatts of power, often reaching peaks of 230,000 kilowatts, an amount greatly in excess of its normal operating limit of 175,000 kilowatts. Transformer banks in many of the system's substations have been repeatedly loaded beyond rated capacity. This condition has required the installation of forced-air-cooling, portable fans and temporary or semipermanent water sprays in order to permit continuous overloads as high as 60 percent above normal ratings in some instances.

Transmission costs have been reduced during the year, in spite of the strains placed on personnel and equipment. Total transmission expense has increased only 12.8 percent over the fiscal year 1943, while the transmission expense per kilowatt-hour delivered has decreased 33.4 percent. Unit operating and maintenance costs have also shown a decrease.

By operating all facilities at maximum capacity during the past fiscal year, the Bonneville Power Administration has been able to meet not only all power demands of its own war customers but to supply other utility systems in the Northwest Power Pool with 1,810,602,507 kilowatt-hours for meeting requirements of their own systems. This was more than double the previous year's deliveries to other utility systems in the Northwest Power Pool.

THE NORTHWEST POWER POOL

But the Administration's contribution to the effectiveness and success of the Northwest Power Pool during fiscal year 1944 cannot be measured entirely in terms of kilowatt-hours delivered. The Administration's far-sighted policies of establishing interconnections with adjoining utilities and providing transmission and generating facilities in anticipation of war and peacetime needs have contributed immeasurably to the present strength and capability of the power pool. The western group of utilities, in particular, would have been hampered greatly in providing power to wartime loads had the Administration's policies not been followed. The policies were formulated in consultation with the War Production Board and voluntarily placed into effect in advance of Order No. L94 of the War Production Board which applied to all utilities of the United States. Even without curtailment of oil-fired generation, the individual capabilities of practically every utility would have been inadequate to serve its loads

without assistance, directly or indirectly, from the Bonneville-Grand Coulee system.

Three interconnections with other utilities were added during the fiscal year, two at 115 kilovolts with the Pacific Power & Light Co. at Vernita, and Pasco, Wash., and one at 13.2 kilovolts with the Northwestern Electric Co. at J. D. Ross substation. The first two, which stem from the acquisition of all Pacific Power & Light Co. property in the vicinity of Hanford, Wash., by the United States Army, replace the Hanford interconnection as a point of delivery to the company's main system. This interconnection continues in effect, however, as a point of delivery to the Washington Water Power Co.-Pacific Power & Light Co. combination via the 115-kilovolt lines acquired by the Army.

The third interconnection was made at the request of the Northwestern Electric Co. to supply additional hydro energy to that system for displacing fuel-generated energy in the Portland area. Preparations for a fourth interconnection with the Portland General Electric Co. at St. Johns substation at 11.5 kilovolts were also under way at the close of the year. Both of these installations are considered temporary, pending completion by the Portland General Electric Co. of another interconnection with the Administration's 115-kilovolt system near Harborton (West Portland), Oreg.

Approximately 50 percent of the electric energy consumed in the 5 northwest States during the past fiscal year was generated at the Bonneville and Grand Coulee power plants and distributed over the Federal transmission system. At the end of the year the peaking capacity of the Administration's system was approximately 50 percent of the combined 5-State hydro generating capacity, and 44 percent of the total generating capacity. The use of Columbia River energy for displacing oil-fired steam energy in the Seattle and Portland areas saved approximately 3,500,000 barrels of critical fuel oil during the year. Without these contributions by the Administration, the effectiveness of the power pool would have been seriously impaired.

Tabulations of energy receipts and deliveries which follow indicate the scope of the Administration's contribution to the effectiveness of the power pool's operation through the use of interconnections during this fiscal year. It should be noted in the tabulation, "Power Pool Operations," that the amount of energy delivered to the adjoining utilities for their own use is listed separately. The amounts scheduled in the column designated "Other" include energy transferred to the Bonneville Power Administration customers and energy losses in connection with such transfers.

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Bonneville-Grand Coulee generation (kilowatt-hours)

	Fiscal year 1943	Fiscal year 1944
Bonneville plant.....	2,801,480,400	3,488,873,892
Grand Coulee plant.....	2,816,955,729	5,751,520,210
Total.....	5,618,436,129	9,240,394,102

Power pool operations—Scheduled interchange¹

Agency	Scheduled to BPA (kilo- watt-hours)	Scheduled from BPA (kilo- watt-hours)	
		For own use	Other
Puget Sound Power & Light Co.....	13,085,000	339,671,000	109,826,000
Tacoma City Light.....	122,672,000	222,018,000	129,006,000
Seattle City Light.....		220,382,000	
Washington-Pacific System.....		227,548,347	137,115,853
Portland G. E. Co.....	24,000	800,983,160	63,310,940
Total.....	135,781,000	1,810,602,507	499,258,893

¹ The other members of the Northwest Power Pool—Northwestern Electric Co. and power systems in Utah, Montana, and Idaho—are not directly interconnected with the Bonneville-Grand Coulee system.

IV. POWER SALES

The Bonneville Power Administration continued to supply power to a major share of the Pacific Northwest's war loads during the past fiscal year, approximately 89 percent of all power generated at Bonneville and Grand Coulee dams going either directly to the Administration's war customers, or to other utility systems in the region to help them meet their war loads.

By June 30, 1944, the Administration had in effect 91 executed power and exchange contracts, with a total over-all contract demand of 1,054,612 kilowatts. This represented an increase of 143,860 kilowatts during the fiscal year. On a contract basis, these demands were divided as follows:

Industrial sales of 894,600 kilowatts; military establishments 23,250 kilowatts; cooperatives 9,170 kilowatts; public or peoples' utility districts 48,200 kilowatts; municipalities, 5,725 kilowatts; and privately owned utility companies 73,667 kilowatts. In addition two municipalities and two private utilities are being served under exchange contracts.

THE PUBLIC POWER MARKET

Three new public-owned power agencies signed contracts during the year, and six new contracts were executed with existing public-agency customers of the Bonneville Power Administration. This brought the total of "public agency" contracts in force at the end of the fiscal year to 54 with a total contract demand of 63,095 kilowatts as compared with a total of 59,685 a year ago. While this increase in contract demand is comparatively small, a better indication of

public-agency growth is gained by a comparison of power consumption figures for the two years. Continuing the upward trend of previous years, the sale of power to publicly owned and operated power distribution agencies, excluding Tacoma and Seattle, by the Bonneville Power Administration increased 60.2 percent, rising from a total of 176,723,021 kilowatt-hours in fiscal 1943 to 283,081,561 kilowatt hours in fiscal 1944.

Public utility districts led the field in increased power use with total 1944 purchases from the Bonneville Administration of 214,923,-990 kilowatt-hours at a cost of \$607,350, as compared with 1943 figures of 123,518,776 kilowatt-hours at a cost of \$364,546. Sales to co-operatives rose from 27,467,193 kilowatt-hours to 37,671,071, while revenues increased from \$122,839 in fiscal 1943 to \$162,756. Sales to municipalities, exclusive of Tacoma and Seattle, climbed from 25,737,-052 in 1943 to 30,486,500 in 1944, and revenue received increased from \$99,212 to \$113,256.

The cumulative list of public agency contracts follows:

Contracts with public agencies as of June 30, 1944

Name of purchaser	Contract demand in kilowatts	Date of execution
I. Public or peoples' utility districts:		
Central Lincoln 1	(1)	Feb. 25, 1942
Clark County, Wash. No. 1	10,250	Aug. 1, 1942
Clatskanie 2	800	Mar. 4, 1942
Columbia River 4	(2)	Dec. 18, 1942
Cowlitz County, Wash. No. 1	5,000	May 16, 1944
Grant County, Wash. No. 2 4	370	June 12, 1942
Grays Harbor Co., Wash. No. 1	3,000	Nov. 1, 1943
Kittitas County, Wash. No. 1	200	July 23, 1943
Klickitat County, Wash. No. 1 4	7575	June 3, 1942
Lewis County, Wash. No. 1	400	May 1, 1942
Nehalem Basin 4	(2)	July 9, 1942
Northern Wasco County 4	4,000	Oct. 28, 1940
Pacific County, Wash. No. 2	980	Sept. 8, 1941
Skamania County, Wash. No. 1 4	925	Apr. 9, 1942
Stevens County, Wash. 4	(2)	Oct. 8, 1943
Tillamook County 4	2,000	May 15, 1940
Union County 4	(2)	Mar. 2, 1942
Wahkiakum County, Wash. No. 1	700	Feb. 17, 1943
Whatcom County, Wash. No. 1 4	16,500	May 15, 1942
Yakima County, Wash. No. 1 4	2,500	July 9, 1941
Total	48,200	
II. Municipalities:		
Canby, Oreg. 9	300	Dec. 22, 1939
Cascade Locks, Oreg.	200	Feb. 14, 1939
Centralia, Wash.	300	Feb. 13, 1940
Drain, Oreg. 10	250	Mar. 14, 1941
Ellensburg, Wash.	2,000	Apr. 1, 1942
Eugene, Oreg.	(11)	Aug. 20, 1940
Forest Grove, Oreg. 9	750	Nov. 7, 1939
Grand Coulee, Wash.	525	Mar. 6, 1943
McMinnville, Oreg.	1,000	Jan. 13, 1940
Monmouth, Oreg.	400	May 1, 1942
Seattle, Wash.	(11)	May 6, 1940
Tacoma, Wash.	(11)	Mar. 5, 1940
Total	5,725	

See footnotes at end of table.

Contracts with public agencies as of June 30, 1944—Continued

Name of purchaser	Contract demand in kilowatts	Date of execution
III. Cooperatives:		
Benton-Lincoln Electric Cooperative, Inc.	400	Oct. 9, 1942
Benton Rural Electric Association, Inc. ¹²	325	June 4, 1942
Big Bend Electric Cooperative, Inc. ³	260	June 11, 1942
Blachly-Lane County Cooperative Electric Association ¹¹	50	Oct. 7, 1941
Clearwater Valley Light & Power Association, Inc. ³	700	June 17, 1942
Columbia County Rural Electric Association	300	Dec. 1, 1942
Coos Electric Cooperative ⁴	(2)	Feb. 29, 1944
Douglas Electric Cooperative, Inc. ¹⁰	625	July 1, 1942
Idaho County Light & Power Association, Inc. ³	160	June 8, 1942
Inland Empire Rural Electrification, Inc. ³	1,400	May 28, 1942
Kootenai County Rural Electrification Association ³	210	June 9, 1942
Lincoln Electric Cooperative, Inc.	700	May 20, 1942
Nehalem Valley Coop. Electric Association ¹²	100	July 1, 1943
Nespelem Valley Electric Cooperative, Inc.	160	June 25, 1943
Northern Idaho Rural Electrical Rehabilitation Association, Inc. ³	400	Apr. 29, 1943
Okanogan County Electric Cooperative, Inc. ⁴	120	June 8, 1942
Pend Oreille County Elec. Cooperative, Inc. ⁴	200	May 1, 1943
Salem Electric Cooperative Association	700	Apr. 26, 1944
Stevens County Electric Cooperative, Inc. ⁴	310	June 2, 1942
Umatilla Electric Cooperative Association ¹²	1,350	Aug. 22, 1942
Wasco Electric Cooperative, Inc.	200	Dec. 1, 1942
Total	8,670	
IV. Irrigation districts:		
Vera Irrigation District ⁴	500	Apr. 4, 1944
Grand total	63,095	

¹ Operating but at present not served by B. P. A.² No contract demand specified.³ Operating but at present has only an emergency service connection with B. P. A.⁴ Not yet in operation.⁵ Served via W. W. P. Co.⁶ Served (at Condit point of delivery) via P. P. & L. Co.⁷ Total of three points of delivery, only one of which is energized or constructed, viz: Condit, 100 kilowatts, North Dalles, 125 kilowatts; Goldendale, 350 kilowatts.⁸ Served via P. P. & L. Co. at White Salmon River point of delivery, but directly by B. P. A. at North Bonneville and Bonneville dam delivery points.⁹ Served via P. G. E. Co.¹⁰ Served via C. O. P. Co.¹¹ Interchange.¹² Served via P. P. & L. Co.¹³ Not energized; completion of line to connect with Eugene substation deferred for duration.**PROGRESS OF PUBLICLY OWNED AGENCIES**

The trend toward post-war thinking and planning was evidenced during the year by the increased activity on the part of the Northwest's publicly owned and operated power distribution agencies. A significant move during the year was the concerted effort on the part of the city of Seattle and the public utility districts in the Puget Sound Power & Light Co.'s service area to purchase the company's distribution properties on a system-wide basis. The public agencies requested the Bonneville Power Administration to participate by acquiring the major generating and transmission properties, and by serving as negotiating agent for the transaction.

In February 1943, the public utility districts and the city of Seattle authorized the Bonneville administrator to act as negotiator for purchase of the properties to be acquired by the public utility districts and the city. The Secretary of the Interior also authorized the administrator to negotiate for the purchase of the company's major

generation and transmission facilities, contingent on congressional approval and appropriation of funds.

An offer of \$90,000,000 for the Puget properties was submitted on behalf of the public utility districts, the city of Seattle, and the Bonneville Power Administration to the company's board of directors on May 18, 1944. The offer was rejected on April 13, 1944, on the grounds that it was not made by an agency giving proof that it had the legal power to acquire such properties and evidence of its ability to finance the acquisition. •

V. CONSTRUCTION PROGRESS

The Branch of Engineering and Operations continued to prosecute vigorously its curtailed wartime construction program during the year. In spite of handicaps imposed by wartime restrictions, the critical shortage of skilled manpower, and manufacturing delays, all energization dates were met promptly and, in many instances, well in advance of the customers' requirements.

Transmission-line facilities placed in service during the year included Spokane-Trentwood Line No. 2, Willamina-Grand Ronde Line, Boyer-Tillamook Line, Salem Alumina Line, Longview-Columbia Way Line No. 2, and Bradford Island Crossing No. 4.

New substations were placed in service at Tillamook and the Salem Alumina plant; switching stations were placed in service at Pasco and Willamina; and the Earlington switching station was removed and reconstructed at South Renton.

Major additions to substations during the year included: Transformers at Spokane, Tillamook, and Bayview; a temporary transformer at the Salem Alumina plant; transformer cooling fans at Midway and St. Johns; shortwave radio stations at Covington and Midway; construction of 230-kilovolt line terminal facilities at Midway for the Hanford No. 1 and No. 2 lines; 230-kilovolt and 115-kilovolt switchgear additions at Midway; installation of synchronous condensers at Spokane and Troutdale; and installation of static condensers at Alcoa.

Major projects still under construction at the close of the fiscal year included a second 230,000-volt, 183-mile line from Grand Coulee dam to Covington, Wash., near Seattle; a second 230-kilovolt transformer bank at the Midway substation, and condenser installations at two other major substations.

The following tabulation shows, by comparison with fiscal year 1943, the system additions constructed during fiscal year 1944. Generating facilities installed at Bonneville and Grand Coulee by the United States Engineers and the Bureau of Reclamation, respectively, are included for completeness.

Facilities placed in service

Type	Installed at end of fiscal year 1943	Fiscal year 1944		Total
		Added	Retained	
Generation (kilovolt-amperes):				
Grand Coulee (including house unit).....	484,000	7,324,000		
Bonneville.....	410,400	108,000		
Total.....	894,400	432,000		
Transmission lines (circuit miles):				
230 kilovolts.....	1,053.2			
115 kilovolts.....	1,078.5	45.4		
69 kilovolts and lower.....	323.0	37.6		
Total.....	2,434.7	83.2		
Substation facilities:				
Transformation (kilovolt-amperes).....	2,050,579	179,000	22,000	
Static condensers (kilovolt-amperes).....	18,800	12,500		
Synchronous condensers (kilovolt-amperes).....	182,500	70,000		
Substations (number).....	43	2		
Switching stations (number).....	8	3		

VI. FINANCIAL STATUS

The financial position of the administration is indicated by accompanying balance sheet for June 30, 1944. This statement has been prepared from cost records maintained by the administration in accordance with the uniform system of accounts prescribed by the Federal Power Commission for electric utilities operating under the Federal Power Act. The balance sheet reveals an investment of \$842,588 in electric plant before deducting the depreciation of \$3,239,330, leaving a net of \$71,603,258. The plant investment includes only the transmission lines, substations, and related facilities. The amount is included in the plant account for the generating facilities at the Grand Coulee and Bonneville projects inasmuch as these projects are under the jurisdiction of other agencies. Information supplied by the Bureau of Reclamation and the United States Army Engineers regarding the investment in generating projects as of June 30, 1944, is given below. The data exclude interest during construction and are subject to account review.

Item	Bonneville Dam	Grand Coulee Dam	Total
Joint purpose facilities.....	\$38,471,990	\$17,783,405	\$56,255,395
Direct power facilities.....	36,106,635	37,094,620	73,201,255
Direct navigation facilities.....	5,480,895		5,480,895
Direct irrigation facilities.....		5,207,182	5,207,182
Total.....	\$40,069,520	\$18,995,207	\$59,064,727

The tenth and last generating unit at the Bonneville Dam was installed in December 1943. The estimated remaining investment required to complete this project was only \$2,400,000 as of June 30, 1944. At the Grand Coulee project the ultimate investment is estimated at \$487,000,000, of which \$280,800,000 is direct investment for construction works.

Bonneville Power Administration balance sheet, June 30, 1944

Assets and other debits

ity plant.....	\$74,842,588
g-term note receivable.....	1 28,000
ergency fund.....	1 500,000
rent and accrued assets:	
Cash—disbursing officers.....	\$623,009
Accounts receivable:	
Power customers.....	1,522,028
Other.....	192,787
Accrued utility revenue.....	2,001,307
Materials and supplies.....	2,253,913
Other current and accrued assets.....	375,225
Total current and accrued assets.....	6,968,269
ferred debits.....	652,786
tal revenue receipts deposited.....	36,457,168
ss:	
Emergency fund.....	1 \$500,000
Cost of Federal power—preliminary.....	1 13,913,891
Interest expense.....	1 5,671,786
Operating expense expenditures.....	1 8,980,648
Total deductions.....	(29,066,325)
Total assets and other debits.....	90,382,486

Liabilities and other credits

ongressional appropriations.....	\$113,920,758
ss:	
Operating expense expenditures.....	1 \$8,980,648
Unrequisitional appropriations.....	32,667,066
Total deductions.....	(41,647,714)
onations and other Federal aids.....	5,003,118
ederal investment.....	77,276,162
urrent and accrued liabilities:	
Accounts payable.....	\$320,106
Other current liabilities.....	77,660
Total current and accrued liabilities.....	397,766
ferred credits.....	27,826
epreciation reserves.....	3,239,330
ontributions in aid of construction.....	175
urplus.....	9,441,227
Total liabilities and other credits.....	90,382,486

Figures in parentheses indicate a deduction.

¹ Received pursuant to contract of sale of certain plant to Public Utility District No. 2 of Pacific County, Wash.

² Created from revenues in accordance with sec. II of the Bonneville Act.

³ Computed at the assumed rate of \$0.00075 per kilowatt-hour pending completion of cost allocations and financial agreements as to cost of power.

⁴ Imputed interest on Federal investment.

⁵ Expended from appropriations for operations.

The balance sheet indicates that revenue receipts have been deposited in the United States Treasury in the amount of \$36,457,168. These receipts are deposited in a special account, except a very small portion representing miscellaneous revenue covered directly into the Treasury, from which a portion has been or will be allocable to the reclamation fund and the remainder has been or will be covered into

the Treasury to the credit of miscellaneous receipts. Upon the completion of accounting analyses and financial negotiations now under way with the Bureau of Reclamation and the Corps of Engineers, War Department, the accounts of the Administration will reflect the application of revenues in much the same way as private industries apply revenue to meet operating expenses, including the cost of power produced at the two Federal dams, interest on the power investment, and repayment of the power investment through an amortization schedule. Inasmuch as these analyses and agreements have not been completed, a consolidated actual financial statement is not available; but the following pro forma statement for the fiscal year 1944 indicates the administration's approximate financial position.

Bonneville Power Administration pro forma statement of consolidated income (partially estimated), fiscal year 1944

Revenues.....		\$20, 893, 363
Operating expenses:		
Bonneville Power Administration....	\$3, 377, 487	
Bonneville Dam project.....	382, 600	
Grand Coulee Dam project.....	993, 329	
Shasta Units: Rental and special costs.....	1, 000, 000	
		\$5, 753, 416
Depreciation:		
Bonneville Power Administration....	1, 119, 429	
Bonneville Dam project.....	439, 100	
Grand Coulee Dam project.....	700, 000	
		2, 258, 529
Total operating revenue deductions.....		8, 011, 945
Net operating revenue.....		12, 881, 418
Income deductions (interest):		
Bonneville Power Administration....	\$1, 846, 057	
Bonneville Dam project.....	1, 100, 000	
Grand Coulee Dam project.....	2, 195, 000	
Total income deductions.....		5, 141, 057
Net income from power operations.....		7, 740, 361

This pro forma statement is based upon information that is now available as to the costs of operating the two generating projects and as to the allocation of the joint investment at these projects to power purposes. In the event the ultimate allocations differ from presently used assumptions, the indicated power cost will be affected. In addition, final figures will reflect adjustments due to the inclusion of interest during construction, and determination of final depreciation and amortization policies. Despite the tentative character of the statements, it is believed that the results are fairly indicative of the answers that may finally be developed.

he statement for fiscal 1944 reflects the actual revenue, operating expenses, depreciation and imputed interest for the Bonneville Power Administration, together with estimates for the expenses, depreciation, interest at the two dams allocable to power. The statement also sets estimates of the costs at the dams for operation, depreciation power facilities including an allocated share of joint items, and imputed interest on the power investment, both direct and joint. The statement thereby indicates the consolidated result of operations, which shows a net income of \$7,740,361 for the fiscal year and is available for amortizing or repaying the investment.

Expenses shown do not include any amounts for the amortization of special war investments in transmission and feeder line facilities although \$1,000,000 is allowed in each of the fiscal years 1944 and 1945 for special costs in connection with the installation of two generating units from the Shasta project as a war measure.

Although revenue for fiscal year 1944 exceeded \$20,000,000, a very substantial proportion of the present revenue is derived from service contracts with war plants and establishments. Of the 1,010,262 kilowatts of total contract demand in active executed contracts, 733,600 kilowatts are in industrial contracts subject to cancellation and an additional 40,850 kilowatts are in very short-term industrial contracts. At the Administration's basic rate of \$17.50 per kilowatt-year these cancellable and short-term industrial contracts involve annual revenue of \$13,552,500. Under industrial contracts having cancellation provisions the total amount of cancellation or termination payments, assuming cancellation of all the contracts effective as of July 1, 1945, would be approximately \$9,200,000, which amount has been set up as representing part the cost of remarketing the power made available by such contract cancellations.

The Bonneville Act and Executive Order 8526 place upon the Administration the responsibility for marketing the power at rates which will make the developments at Bonneville and Grand Coulee financially self-liquidating. The high rate of revenues during the war period, when facilities are operating at extreme overloads and without reserve facilities, has resulted in a surplus that may very well prove to be the medium through which the administration's financial responsibility will be met during the immediate post-war reconversion period when it will be necessary to develop peacetime markets to use the power that has been going into war production. A portion of this surplus should in effect be used now for advance marketing work; the balance will serve as a reserve for post-war adjustments.

VII. ADVANCE TRANSMISSION PROGRAM

Contemplated plans for future transmission line construction based on regional studies made by the Administration are extensive. It is

proposed that the main 230,000-volt transmission grid be extended in the immediate post-war period to tie into the Bonneville-Coulee system new generating plants such as those planned for the Umatilla, Hungry Horse, Cabinet Gorge, and Detroit projects. In addition, new 230,000-volt facilities are proposed for the north Puget Sound area in order to deliver more energy to pulp and paper mills and to meet the demands of expanding industrial growth anticipated in that area.

The over-all transmission capacity of the main system into the Portland area will be increased with new points of delivery. Extensions and reinforcements are planned for the lines into the Willamette Valley. Also planned are extensions into Union County, Oreg., to compensate for power deficiencies in the central Oregon districts.

Contemplated additions to the main transmission grid include lines to Clallam and Jefferson Counties in Washington State to increase the power supply on the Olympic Peninsula now limited by lack of transmission facilities. New lines are planned for Stevens County and the Metaline Falls district of Pend Oreille County to provide for the expansion of the mining industries in the area.

Reinforcement of the various substations and feeder lines of the Bonneville system is planned to help relieve overloaded conditions of facilities and to provide the necessary reserves for normal peacetime service.

These extensions will bring to the outlying districts of the Pacific Northwest a supply of electric power for domestic, agricultural, and industrial uses at the lowest rates available in the nation. To determine the developmental possibilities in these and all other sections of the region, the administration is carrying on a program of county-wide economic surveys. Ten of these have already been completed for counties in the States of Washington and Oregon. A considerable portion of the \$127,000 fund appropriated by Congress for market development activities will be devoted to the expansion and acceleration of these studies in preparation for post-war programs.

Southwestern Power Administration

DOUGLAS G. WRIGHT, Administrator



THE Southwestern Power Administration, an agency of the Department of the Interior, was created by order of the Secretary of the Interior on August 31, 1943, for the purpose of fulfilling the requirements of the Executive Orders 9366 and 9373 which provide for unified administrative control of (a) the operation of the Grand River Dam project and the marketing of the power generated by the project, (b) the marketing of power generated by the Norfolk Dam project, operated by the United States Army Engineers, and (c) the marketing of the power generated by the Denison Dam project, also operated by the United States Army Engineers.

The Southwestern Power Administration assumed these duties on September 1, 1943, with the present Administrator appointed as Acting Administrator.

GRAND RIVER DAM PROJECT

The Grand River Dam project was constructed by the Grand River Dam Authority, an agency of the State of Oklahoma, under a Public Works Administration loan and grant agreement. Construction was started in 1938 and the plant began commercial operation May 1, 1941. Of the total \$25,113,636 estimated cost of the project, \$11,113,636 was supplied by the Federal Government as a grant and \$14,000,000 as a loan which is to be repaid by the Grand River Dam Authority from revenues of the project. The initial installation was four 15,000-kilowatt generating units and space for two additional units.

With the power supply for war production becoming critical in 1941, the President on November 21 assumed control of the project on behalf of the United States under section 16 of the Federal Power Act and

designated the Administrator of the Federal Works Agency to operate the project and dispose of the power generated.

Contracts were negotiated for the sale of power to war industries. Forty thousand kilowatts of the capacity were committed to the Ark-La Electric Cooperative, Inc., for transmission to the Defense Plant Corporation's aluminum plant at Jones Mills, Ark. Other war loads served were Camp Gruber near Muskogee, Okla.; the Oklahoma Ordnance Works near Pryor, Okla.; and the Cardox Corporation at Claremore, Okla.

During the period of Federal control, from November 21, 1941, through June 30, 1944, the gross revenue amounted to \$3,630,692.

NORFORK DAM PROJECT

On June 19, 1943, the President under Executive Order 9353 assigned to the Administrator of the Federal Works Agency the additional responsibility of marketing the power generated at the Norfolk Dam project in Arkansas, which is a combined flood control and hydroelectric development on the North Fork of the White River. This project was constructed and is to be operated by the United States Army Engineer Corps. The project was built with an initial installation of one 35,000-kilowatt generating unit and provision for three additional units. The cost of the Norfolk project is approximately \$26,000,000.

Generation for test purposes started on June 18, 1944. Commercial operation is expected to begin by December 1944. Meanwhile, the plant is being used to generate emergency power that is vitally needed in the southwest area because of unexpectedly heavy war loads and the unexpected failure of some generating equipment on the systems of the privately owned utility companies.

DENISON DAM PROJECT

The Denison Dam project, built by the United States Army Engineer Corps and located between Texas and Oklahoma on the Red River near Denison, Tex., was scheduled for completion in 1944.

The Denison Dam project, like the Norfolk project, is a combined flood control and hydroelectric development. It is also to be operated by the United States Army Engineer Corps. The cost of the Denison project is approximately \$54,000,000. The initial installation consists of one 35,000 kilowatt generating unit and provision for four additional units.

The project commenced test operations in June 1944 and is now being operated on an emergency basis to supply power in the north Texas area. Commercial operation is expected to begin during the first half of 1945.

COORDINATED OPERATION OF THE THREE PROJECTS

With three federally controlled projects within a short distance of each other, it was readily apparent that their operations should be coordinated to assure maximum efficiency. Since the Secretary of the Interior was already well experienced in power-marketing operations through his supervision over the Bonneville Power Administration and the Bureau of Reclamation, the operation of Grand River Dam and the marketing of power from all three projects were placed under his jurisdiction on September 1, 1943.

The Grand River, Denison, and Norfolk Dam projects are all connected to the Southwest power pool transmission network. It is possible, therefore, to coordinate their operations by arranging for the interchange of power and energy between projects during periods of low water or in emergencies as well as for meeting high load commitments. When full commercial operation starts, this flexibility of interchange of energy will permit the Government to make commitments for each project for considerably more load than it could if each project were operated separately. This gain will directly benefit our country's effort.

MARKETING POLICIES

The Grand River Dam project has its own transmission system which enables it to serve its customers directly and without relying on the facilities of others. Interchange agreements with the Public Service Co. of Oklahoma and the Oklahoma Gas & Electric Co. provide on- and off-peak steam-generated power and energy.

Project sales approximate 420 million kilowatt-hours of firm energy per year.

The Denison and Norfolk projects, on the other hand, do not yet have adequate transmission facilities. It was therefore necessary, for the time being, to market the power produced by these projects through the existing transmission facilities of the private utility companies. Under these circumstances it was necessary to negotiate agreements whereby the energy would be sold to the nearest private utility company and these companies in turn were to pass on to war industries, rural electric cooperatives, and other customers the financial benefits derived from the purchase of this low cost energy. A contract has been executed for the output of the Denison plant, providing among other things for a rate reduction in excess of \$400,000 per year. A similar contract is being negotiated with the Arkansas Power and Light Co. for the output of the Norfolk plant.

POST-WAR OPPORTUNITIES

The Grand River Dam project has as customers three municipalities and four Rural Electrification Administration projects. In

addition to these it serves a new plant of the Cardox Corporation at Claremore, and has a contract to serve the new Goodrich Rubber Products plant at Miami, Okla. These are permanent customers which are expected to continue in business after the war. The Denison and Norfolk projects do not as yet have any industrial customers.

The Southwestern Power Administration has an industrial unit which is engaged in the promotion of new customers for the area that will use power after the war. This unit is working with the various chambers of commerce and civic groups throughout the area in the preparation of industrial surveys of the various towns and cities in the regions served by the Grand River, Norfolk, and Denison Dam projects. The Arkansas, Red, and White River Valleys served by these projects offer a promising field for industrialization because of the abundant natural resources and raw materials in their regions.

While the capacity of the three dams is at present largely required for war purposes, there is ample opportunity for post-war operations to absorb the entire output of these three projects as well as a number of new projects which are to be built by the Army after the war. In order to assure proper disposition of this additional power and energy, the Southwestern Power Administration is now studying post-war market possibilities of the area and the transmission facilities needed to serve this probable market.

Bureau of Mines

R. R. SAYERS, Director



FOREWORD

IN CENTERING every effort on the fulfillment of war assignments, the Bureau of Mines in 1944 contributed heavily to the procurement of adequate mineral commodities for victory and the post-war security of the United States.

The great expansion of domestic production, implemented by increased imports during the year, assured ample supplies of virtually all major metals needed for war and essential civilian use. By adding millions of tons to the Nation's known reserves of critical and essential ores and by developing new processes for the utilization of these domestic ores, the Bureau not only furthered the war program but also strengthened national security and improved the prospect of new and better materials for peacetime America.

The war activities of the Bureau augmented its accumulated knowledge of the mineral resources of the United States and Alaska. The urgent demands for metals and minerals prompted the most extensive exploratory program ever attempted. But the urgency of the program at the same time stressed the need for a complete inventory of these resources before another national emergency arises.

Maintaining extreme flexibility in all of its activities, the Bureau swiftly shifted the emphasis of its exploration and research programs to meet each new requirement. As market analyses and military strategy indicated changes in the availability and need for certain metals and minerals last year, the Bureau modified its search for such traditionally strategic minerals as manganese, chromium, mercury, and tungsten, and stressed such minerals as fluorite, beryl, optical calcite, and barite instead.

The exploratory program, conducted in part with the cooperation of the Geological Survey and State agencies, made substantial contributions toward an adequate supply of all these minerals. In addition,

it made known important additional reserves of bauxite, alunite, aluminous clay, mica, and the ores of iron, zinc, lead, copper, molybdenum, and vanadium, together with workable deposits of numerous nonmetallics, including fluorspar, graphite, corundum, kyanite, sillimanite, celestite, and block talc.

Thousands of ore samples were analyzed and many of these were subjected to beneficiation tests to determine whether the minerals could be feasibly extracted. Laboratories and pilot plants developed successful processes for the production of manganese and chromium from domestic low-grade ores and demonstrated methods for the utilization of available low-grade bauxites, alunites, and aluminous clays. Metallurgical investigations and ore-dressing studies conducted on many zinc, lead-zinc, and other ores extended the lives of existing mines and demonstrated the workability of newly developed ore bodies. Milling tests on pegmatites yielded acceptable concentrates and indicated that, with further refinement, milling may supplant wasteful and inefficient hand-sorting of these ores.

A process developed by Bureau chemists and engineers added a new light, strong, and corrosion-resistant metal, titanium, to the practicable list of materials of the future. Industry achieved a considerable reduction in metal losses by adopting techniques evolved from the Bureau's research on the recovery of valuable constituents from aluminum and magnesium drosses, powders, and dust.

With war draining the Nation's petroleum reserves and hastening the day when the United States may have to look elsewhere for motor fuels and lubricants, the Bureau completed preliminary plans for an extensive research program on producing synthetic liquid fuels from coal, oil shale and other materials. Airplanes and automobiles already have been operated successfully on synthetic fuels produced in the Bureau's laboratory-scale pilot plant. Now the task is to build and operate larger demonstration plants to provide technical knowledge and make commercially feasible what may possibly become a great new post-war industry. The preservation of motorized transportation and assurance of adequate national defense for future generations of Americans are the goals.

As coal and all other fuel shortages became acute, war industries relied more heavily upon the Bureau's many services in the field of solid fuels. The Bureau surveyed the entire beehive coke industry and provided technical aid to facilitate production of high-quality metallurgical coke of uniform grade for the steel industry. It explored coal fields of the West to find new sources of coking coals, advised on the substitution of available coals for specialized uses, helped mine operators improve the quality of their product, developed safe methods of storing subbituminous coal during the slack season to ease the manpower shortage, and maintained a consulting service for in-

dustry and Government on fuels and fuel-burning equipment. Millions of tons of coal were sampled and tested for Army, Navy, and other Government purchasing agents, and the volume of boiler water samples analyzed was tripled, saving thousands of dollars and increasing the efficiency of Federally-operated power plants.

With the cooperation of industry, the Bureau opened a Nation-wide fuel efficiency program to combat waste in the industrial and commercial use of all types of fuel and energy.

The Bureau's research on petroleum and natural gas, conducted under stress to meet war objectives, will contribute heavily to the needs of the peace era to come. To supply more oil for war but at the same time prolong the life of the Nation's oil fields, long-range engineering studies were made of producing areas engaged in primary extraction and the latest technical information on secondary recovery was collected and disseminated among operators. Many special reports prepared for the Petroleum Administration for War aided refiners in meeting production schedules on fuel for warplanes, toluene for explosives, and other petroleum products. Particularly significant was the discovery of new sources of base stock and high-octane components for blending into aviation gasoline.

By completing and putting into operation three new helium plants within a single year, making five in all, the Bureau again met the vast helium requirements of the armed forces and, in addition, provided considerable quantities for commercial consumers and the scientific development of new uses for the post-war period.

The Bureau made more than 4,000 chemical analyses and control tests on explosives and inflammable materials, supplementing its own work by placing at the service of the Army, Navy, and other war agencies its research facilities and years of experience in testing blasting materials for the mineral industries. In addition to providing technical information needed in designing munitions and safeguarding manufacturing plants, the Bureau determined inflammability and explosibility factors for organic chemicals used in rapidly expanded textile, synthetic rubber, and plastics industries, and developed new safety standards governing diesel mine locomotives and mine explosives.

With the assistance of the safety, plant-security, and health programs of the Bureau of Mines, the mineral industries in 1944 lowered accident rates in some fields despite war handicaps, and maintained a perfect antisabotage record in all. This is concrete evidence of greater safety achievements to come when the end of the war eliminates the adverse conditions embodied in long hours, inexperienced labor, equipment shortages, and the need for maximum production.

Federal coal mine inspectors visited and revisited hundreds of mines in the United States and Alaska, and attributed the innumer-

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the post-war United States the ability to compete in world mineral production. Aimed at effective utilization of widespread deposits of steel-making materials, including the ferroalloys and fluorspar as well as iron ore, the program calls for compilation of a detailed record of these resources and the construction of three pilot and demonstration plants in the areas in which the raw materials exist.

A 5-year program of research and demonstration-plant construction will be pursued under the Synthetic Liquid Fuels Act in cooperation with the oil and coal industries. The program envisages the construction of an oil-shale demonstration plant and demonstration plants for synthesis of liquid fuels from coal and lignite to provide the information on design and operation needed for ultimate private commercial developments. Meanwhile, research will continue in the Bureau's laboratory-scale hydrogenation plant, and a pilot plant under construction at Grand Forks, N. Dak., will be completed for gasification of subbituminous coal and lignite to provide water gas for reduction of iron ore and synthesis of oil or gasoline from coal. The Bureau's newly installed electron microscope will be used to study the constitution of coal in relation to the problems of carbonization and hydrogenation.

To assist the anthracite industry, new research programs are underway on the prevention of floods, and increased production by mechanical mining.

To increase pig-iron production, new and more extensive investigations will be conducted with a view of improving the quality of coking coal and metallurgical coke. Exploration of western and southwestern coal fields for new sources of coking coals will continue, together with research on problems of making and using sponge iron, producing steam from solid fuels, effects of slag on furnace performance, use of substitute fuels, fuel-burning equipment, explosives, and mine operations. The scope of tests on the explosibility of industrial dusts will be widened to include factors not amenable to laboratory treatment, and the Nation-wide campaign promoting efficient commercial and industrial use of fuel and energy will continue.

With the expansion of helium-production facilities virtually completed, activities have turned to economies in production, conservation of helium, better transportation methods, and wider commercial uses. Pipeline facilities needed to return surplus helium to underground storage will be completed in October 1944, saving for future military, medical, scientific, and commercial uses millions of cubic feet that otherwise would be lost forever in fuel gas going to market. Investigations will be undertaken for improving metals by using helium in their manufacture and for bettering the process in which helium is used as an inert atmosphere around the torch in welding magnesium, aluminum, and alloy steels. A pilot plant is being constructed for

liquefying helium in large quantities for use in investigating metallurgical processes and properties of metals, and efforts will be made to design a container for transporting helium in liquid form, which would save vast quantities of steel required for cylinders and tank cars, reduce freight charges, and lighten the burden on transportation facilities.

Congress having appropriated funds for the employment of 25 additional coal-mine inspectors, the Bureau will increase its total field staff to 132 inspectors and 10 specialist engineers and inspect a greater number of mines. This should result in more improvements in safety practices and further curtailments in coal-mine accident rates over a period of years.

SUMMARY OF ACTIVITIES

TECHNOLOGICAL WORK

Exploration and Metallurgical Research

As the flood of the United Nations' war production approached the crest and required more and more raw materials, mineral exploratory crews of the Bureau of Mines ranged into new and untouched areas of the United States and Alaska and its scientists delved deeper into the mysteries of metallurgy to meet each new challenge for metals and mineral products.

Changing fortunes of war altered the relative need for various metals, and the Bureau swiftly shifted the emphasis of its exploratory and research work from such traditionally strategic minerals as manganese, chromium, mercury, and tungsten, to fluorite, beryl, optical calcite, and barite. The exploratory work made substantial contributions toward a growing security in each of these materials, and the Bureau had a leading part in developing a new alloy of copper, electrolytic manganese and nickel, which may make a future supply of beryl for motor parts and other uses less critical.

The search for additional bauxite and the demonstration of methods for utilizing domestic low-grade bauxites, aluminous clays, and alunites were continued with outstanding success. The quest for more raw materials for the steel industry, including alloying elements, established important new sources of iron, tungsten, nickel, and chromium ores. Bureau laboratories concentrated on effective utilization of these ores and those from low-grade manganese and chrome deposits found by exploratory crews. Some of the processes developed doubtless cannot be employed during the present war, but they will be available in any future emergency.

A large volume of work remains to be done, and additional pilot plants are planned for 1945 to demonstrate how to utilize minerals

of definite areas in war and peace. Mining and metallurgical research will be conducted in the eight experiment stations and the program will be administered through regional and district offices to maintain close and effective cooperation with the mining industry and with State and other local agencies (as of June 30, 1944, there were 3 regional offices and 25 district offices). A new electrodevelopment laboratory, authorized by Congress 2 years ago, has been opened at Albany, Oreg., to study mineral treatment problems of the Northwest, where low-cost power will be a factor in post-war developments.

Advancements of the Bureau toward the projected goal of a complete inventory of national mineral resources and effective methods of processing these minerals are reflected in the progress reports for various commodities.

Iron, steel, and ferroalloys.—Substantial tonnages of ore were indicated in many areas as the Bureau of Mines, helping the iron and steel industry maintain its war production schedules by providing adequate raw materials, explored 70 deposits in 30 States and Alaska during the year. Some of the 70 deposits, which included 35 iron, 4 chromium, 6 manganese, 3 molybdenum, 3 nickel, 4 vanadium, 7 tungsten, and 8 fluorspar deposits, are now supplying the metal for landing boats, heavy guns, tanks, and other weapons being used to drive the Jap from his island outposts and the Nazi from occupied areas of Europe.

Continuing its exploration for additional iron ore for a greatly-expanded steel industry, the Bureau has found large tonnages of usable ore in Utah, Nevada, California, and Montana to feed the new blast furnaces of the West. At the Scotia mine in Pennsylvania, the Bureau indicated more than a million tons of washed ore reserves (brown ore) with a marketable grade between 48 and 51 percent iron, and the property should be in production soon, for commercial interests were erecting a sink-float plant to beneficiate the ore. At the Poorman iron deposit on Kasaan Peninsula, Prince of Wales Island, Alaska, an exploration project indicated approximately a million long tons of measured ore, with an average content of 52.4 percent iron. In Georgia, similar work resulted in the mining and shipment of considerable tonnages of brown iron ore to the furnaces at Birmingham, Ala.

Intensive study has shown that most of the iron ores from deposits explored by the Bureau can be concentrated to metallurgical-grade, and that very high purity concentrates particularly suited to one type of sponge iron manufacture can be produced from a deposit in North Carolina and another in New Mexico. Adoption of a non-choking classifier developed by the Bureau made possible additional recoveries with higher-grade products at plants treating Alabama red iron ores.

Sponge iron research and pilot plant work progressed at several points. At Laramie, Wyo., production was begun at the large sponge iron rotary kiln demonstration plant, using local coal and iron ore as the raw materials, but additional investigations will be necessary before the commercial possibilities are known. At Longview, Tex., experiments were completed at a semicommercial plant using natural gas and Texas iron ore, and commercial interests were considering recommendations for changes to bring the plant into production. A dual process was developed for making sponge iron from low-grade, refractory, Minnesota iron ores, using gas obtained from North Dakota lignite, and plans were completed for combining these steps in a demonstration plant. About 250 tons of sponge iron, produced in Bureau-operated brick plants in Ohio and North Carolina, was being used in commercial plants to determine its value for the production of steel and wrought iron.

To lessen the dependence of the steel industry upon imports of ferroalloys, the Bureau of Mines last year conducted exploration work for all of these minerals—chrome, manganese, cobalt, nickel, tungsten, vanadium, and molybdenum.

A large tonnage of low-grade manganese ore was delineated in Pennsylvania, and Bureau exploration projects for mangiferous iron ore were successful in Georgia where two of the properties drilled were in production. Mining, ore-dressing, and other problems involved in using the extensive but low-grade manganese ores at Chamberlain, South Dakota, still were under study.

As the shipping shortage eased, permitting importation of higher-grade ores, all of the major manganese production projects recommended by the Bureau were abandoned except one—the milling project at Butte, Montana. The Las Vegas hydrometallurgical project, which had not been recommended by the Bureau, failed to produce substantial quantities of manganese and proved the need for extensive pilot-plant testing of processes before large-scale use. Such tests were completed on two processes developed in the Bureau laboratories, the nitrogen dioxide and the dithionate methods, and these now are available for quantity production of manganese from domestic low-grade ores in any future emergency.

The foundation for effective peace-time use of domestic manganese deposits was laid firmly at Boulder City, Nev., where the Bureau's electrolytic manganese pilot plant was operated with greater efficiency. The product was used in magnesium bomb cases and in a variety of steels and nonferrous alloys tested for commercial value.

The Bureau continued exploration work on the iron-nickel-chromium ores of Washington and completed small-scale pilot plant tests demonstrating the feasibility of smelting these ores.

of definite areas in war and peace. Mining and metallurgical research will be conducted in the eight experiment stations and the program will be administered through regional and district offices to maintain close and effective cooperation with the mining industry and with State and other local agencies (as of June 30, 1944, there were 3 regional offices and 25 district offices). A new electrodevelopment laboratory, authorized by Congress 2 years ago, has been opened at Albany, Oreg., to study mineral treatment problems of the Northwest, where low-cost power will be a factor in post-war developments.

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Deposits of molybdenum also were explored in North Carolina, Montana, and Arizona. The most outstanding find was in Halifax County, North Carolina, where about 500,000 tons of inferred low-grade ore with an average content of 0.55 percent molybdenum was indicated. A substantial tonnage of submarginal molybdenum material was found in Montana.

Completing approximately 39,000 feet of diamond drilling on 40 vanadium properties in the Colorado-Utah area, the Bureau indicated approximately 40,000 tons of minable ore and a considerable part of this ore already has been mined. Exploration of vanadiferous deposits in Wyoming revealed approximately 1,481,000 tons of inferred low-grade ore with an average grade of about 0.746 vanadium, and methods for treating this material have been developed in Bureau laboratories.

Important new fluorspar industries with a promise of peace-time permanency sprang up in Utah and Texas as a result of Bureau work, and approximately 41,500 tons of fluorspar with an average grade of 30 percent, which can be concentrated, were indicated in the Kentucky-Illinois fields. Metallurgical tests conducted in conjunction with exploratory work on fluorite deposits in Utah, have shown the ore to be amenable to concentration for production of metallurgical and acid-grade fluorspar, and the Bureau has developed a method by which the finely-divided flotation concentrate can be agglomerated to meet the size requirements of the metallurgical industry. A mill was constructed and this property went into production. The Bureau's exploratory work in Texas opened a new fluorspar mining district in the Eagle Mountains of Hudspeth County which is one of the more significant recent developments in that State.

Nonferrous minerals.—Concurrent with an expanded program of exploration and research on zinc and lead ores, the Bureau of Mines launched a major drainage project to revive the dormant Leadville district in Lake County, Colorado, where 84 flooded mines have been idle since 1933. A tunnel now under construction for the permanent gravity drainage of these properties will make available an estimated 4 million tons of readily-mined zinc, lead, and manganese ores for the security and commercial needs of post-war America.

Exploration of 30 deposits in 15 States last year added 12 million tons of new zinc and lead-zinc ores to the country's reserves. In the same period, 730 zinc and lead deposits were examined by Bureau engineers, and ore-dressing tests and other metallurgical investigations in the Bureau's laboratories determined efficient methods of utilizing many ores. These combined activities extended the lives of producing

mines and demonstrated the workability of newly developed ore bodies.

Conducting 17 exploration projects for copper in 10 States, the Bureau marked out 773,000 tons of commercial ore containing 2.0 percent copper and 406,000 tons of marginal ore containing 1.3 percent copper. The work involved diamond and churn drilling, trenching, test-pitting, rehabilitating old mine workings, sampling, and drilling long holes with percussion air drills.

Carrying their quest for tin to remote Seward Peninsula, where only the storm-whipped Bering Strait separates Alaska from the Soviet Union, Bureau engineers explored six deposits before snow and bitter cold compelled suspension of the work until another summer. Three additional deposits were explored, two in Montana and one in California. A recoverable reserve of 3,450 tons of tin was indicated in three of the nine deposits.

Ore containing the equivalent of 6,100 flasks of mercury was delimited by a Bureau exploratory crew at a mine in Alaska, and drilling in Napa County, Calif., indicated submarginal mercury ore in sufficient tonnage to warrant continuing the work in the 1945 fiscal year. No ore was found in 3 other explorations.

Trenching, tunneling, and diamond drilling were carried out on 19 pegmatite deposits in 9 widely scattered States, and extensive experiments were conducted on ore-dressing methods for extracting the minerals from their ores. At 9 deposits, Bureau personnel established workable reserves of strategic mica for radio parts and aviation spark plugs; at 8, significant quantities of beryl for alloys used in springs, motor parts subject to wear, and parachute harness fasteners; at 2, commercial quantities of lithium for high-conductivity copper castings, ceramics, and pharmaceuticals; and in 2 others, exploitable reserves of rare tantalum minerals for radio vacuum tubes and surgical and dental supplies.

Recent pioneering tests in the Bureau's laboratories and pilot plants on the milling of pegmatites to segregate the desired minerals have yielded acceptable concentrates, indicating that with further refinement milling may supplant the present wasteful and inefficient hand-sorting of these ores.

Nonmetallic minerals.—Now essential in a multiplicity of war products, the nonmetallic or industrial minerals will acquire added importance in the approaching post-war period when there will be an immense demand for building materials, insulating products, fertilizer minerals, paints, pigments, and inorganic compounds. With the double objective of satisfying the needs of war and peace, the Bureau of Mines charted workable deposits of graphite, corundum, optical calcite, kyanite, sillimanite, celestite, block talc, and barite. Means for beneficiating and using these domestic resources were developed

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through intensive laboratory research and partial independence of foreign sources was established.

Achievements of the year were numerous. Light-weight, high-temperature refractories of the "Navy" brick type were made from topaz and domestic kyanite but will require some minor perfections. Special insulators for military and other radio equipment were prepared from domestic talcs, replacing former imports, and promising deposits of block talc were found in California and Montana. Exploration for domestic graphites was concluded and methods were developed for recovering a maximum of large flake needed as a lubricant, for foundry facing, in the manufacture of crucibles, stoppers for steel ladles, and other war uses. Eliminating a long rail haul, commercial development began on foundry molding sands explored in Oregon, and a tremendous reserve of commercial-grade sillimanite discovered in South Carolina will be exploited more thoroughly at once. Preliminary tests on bauxitic clays associated with the Alabama and Georgia bauxites indicated that many were suitable for high-temperature refractories, and they will be investigated in greater detail. Domestic clays were classified and a publication was issued enabling the average person interested in the development of clay products to determine for what purpose a specific type is best adapted.

Light metals.—Anticipating the accelerated tempo of the victory drive and the demands for aluminum, magnesium, and their alloys, the Bureau of Mines called on its exploratory, laboratory, and pilot plant crews to promote a still greater output of these light metals from domestic sources.

Responding to the challenge, exploratory crews quadrupled their 1943 discoveries by increasing known reserves of bauxite more than 40 million tons, of which about 15 million tons were of a grade suitable for direct use in present Bayer alumina plants. Since much of the bauxite was found at depths supposed to preclude economical exploitation, the Bureau undertook studies to develop new methods of mining the material. In Arkansas, construction began on a pilot mill to demonstrate the commercial feasibility of a Bureau process for beneficiating low-grade bauxite to yield a feed for Bayer-plant processing.

Other exploratory drilling increased the reserves of alunite, another alumina-bearing material, to more than 32 million tons, and the Nation's aluminous clay deposits were proven to exceed 1 billion tons.

A large factor in securing War Production Board authorization for the construction of several 50-ton-a-day semicommercial alumina plants, the Bureau's pilot-plant work on chemical processes was continued to permit use of alunite, clays, and other aluminiferous ores. Commercial sponsors of the alumina plants called upon Bureau engineers for aid in designing, installing, and ultimately putting the plants into operation.

At the Bureau's Norris, Tenn., laboratory, engineers and chemists developed a process for producing magnesia, nickel, chromite, and silica gel from North Carolina and Washington olivines, a magnesium-silicate material which constitutes the Nation's second largest reserve of magnesium and one which previously had defied attempts at utilization. The process will be carried to the pilot-plant stage to obtain information on cost, design, and operation.

A process for the production of magnesium oxide and magnesium chloride from dolomite was developed with the cooperation of a private concern and was submitted to pilot-plant tests. During this investigation, a method was found for rotary kiln decomposition of magnesium chloride hexahydrate, an operation that had been considered commercially impracticable. Large-scale pilot work on the production of magnesium metal directly from the oxide by electrolytic means was continued, together with research on the carbothermic reduction process.

Industry achieved a considerable reduction in metal losses by adopting techniques evolved from Bureau studies on the recovery of valuable constituents from aluminum and magnesium drosses, powders, and dust.

Titanium, a light, strong, and corrosion-resistant metal, was added to the list of useful materials of the future by a process developed by chemists and engineers of the Bureau laboratories at Salt Lake City, Utah. The process work, involving powder metallurgy, is being carried forward at Boulder City, Nev., and at Salt Lake City in preparation for pilot-plant experiments.

Coal and Coal Products

Greater production of coal and coke, better quality fuel, and conservation of fuel resources through more efficient utilization—these were the focal points for the multifold solid-fuel activities conducted by the Bureau of Mines during 1944 to meet the staggering demands of war and to maintain the position of the United States as the No. 1 industrial power when peace returns.

Coal analysis.—More than 20,000 samples of coal, coal dust, coke, peat, pitch, and tar were analyzed during the year. The tests helped guide Government purchasing agents in awarding contracts for millions of tons of coal, aided Federal coal-mine inspectors in formulating recommendations to curb coal-dust explosion hazards in mines, assisted Bureau engineers and scientists in coal-field exploration and research, and helped operators improve the quality of their products. Savings by the War Department alone in rejecting inferior fuels were greater than the actual cost of the service. At that Department's request, the Bureau sampled coal and trained Army personnel in coal sampling at military posts throughout the country. The volume of

tests made on boiler feed water was tripled to prolong the life and increase the efficiency of Army boiler plants. A consulting service was maintained for industry and Federal agencies on substitute fuels, types and changes in fuel-burning equipment, and means for increasing efficiency of power plants.

Coal mining and exploration.—Coal fields of the West were explored to find new sources of coking coal for steel plants in that area and to locate minable beds to relieve the critical fuel shortage in the Pacific Northwest and provide an adequate supply for post-war development. Studies were made on new methods for distributing rock dust and the use of air conditioning to curb roof falls. Many operators were assisted in improving mining practices.

Gas- and dust-explosion research.—Mechanization of coal mines and increased production for war posed problems which made necessary the testing of larger-than-standard charges of permissible explosives to determine their gas-and-dust ignition hazards. Other services to industry with a post-war value included determinations of the inflammability of powdered metals and plastics. Military pyrotechnics also were tested.

Coal preparation and storage.—To supplement limited supplies of high rank coals needed in certain industries, the Bureau investigated conversion of marginal coal by preparatory treatment and the salvaging of coal now rejected merely because it is mixed with impurities. Helping to alleviate conditions resulting from the critical manpower shortage, the Bureau developed methods for storing during the slack mining season unlimited quantities of subbituminous coal in open pits and in homes without loss from oxidation or spontaneous combustion. Safe storage now is possible on the West coast, at isolated Army posts, and at other places remote from the sources of supply.

Coal combustion.—The Bureau developed a small, new-type stoker which will burn subbituminous coal for 30 days without attention and supply hot water for a normal-size family at a cost of less than a dollar a month. Offering a post-war promise of modern heating service at minimum expense to Western rural families, the Bureau plans to develop larger models for household heating. Meanwhile, research continued on the effect of coal-ash on the operation of large boiler furnaces generating power for essential industries, and means were developed for preventing serious loss of steam capacity from external corrosion of furnace wall-tubes. Successful methods were found for using small sizes of anthracite as domestic fuel, which may help ease shortages in the larger sizes.

Fuel efficiency.—To offset or at least alleviate a possible fuel shortage in the winter of 1944-45, a National fuel efficiency program was launched during the year with the cooperation of industry to combat wasteful practices in the commercial and industrial use of all types of

fuel and energy. A council of 12 leading fuel engineers was established, and 110 coordinators were appointed to administer the program in assigned areas with the assistance of 5,000 "regional engineers," all volunteers from industry.

Coke studies.—Answering a plea from the Nation's steel industry for more and better-grade metallurgical coke, the Bureau of Mines sent engineers and a mobile laboratory into the field, conducted a critical survey of the needs of the entire beehive coke industry, and provided operators with the technical information needed to produce the blast furnace fuel required for maximum steel production. A study was made of methods employed by certain coal companies in producing coal of uniform ash and sulfur content by careful blending of coal and control of the mining operation, and tests were conducted on the carbonizing, expanding, and storing properties of coals from newly developed fields to maintain supplies of suitable coking coals.

Synthetic liquid fuels.—Noting the unparalleled war withdrawals from the petroleum reserves of the United States and the continuing decline in the discoveries of new oil fields, the Seventy-eighth Congress appropriated \$5,000,000 and authorized the Bureau of Mines to construct and operate demonstration-size plants to produce synthetic liquid fuels from coal, oil shales, agricultural, and forestry products. Guided by experiments conducted for several years in a laboratory-scale pilot plant and other installations, the Bureau has prepared comprehensive research programs on coal hydrogenation, synthesis of liquid fuels from hydrogen and carbon monoxide, and shale-oil extraction, and is designing the new equipment and buildings needed. The project will help provide the "know how" for ultimate private commercial production and a lasting supply of fuel for the machines of a post-war motorized America.

A pilot plant for complete gasification of subbituminous coal and lignite was designed, built, and tested successfully during 1944. Another pilot plant is under construction at Grand Forks, N. Dak., which will provide 400,000 cubic feet of hydrogen-rich water gas daily for the reduction of iron ore and could be employed for synthesis of oil or gasoline from coal. Tests have shown that subbituminous coal will yield the same amount of water gas as high-rank coals, although its cost at the mine is less than half. Meanwhile additional progress was counted in certain phases of laboratory experiments on coal hydrogenation and synthesis of liquid fuels, and a method was developed for predicting the yields of primary tar and light oil from analyses of the coal.

Petroleum and Natural Gas

Many important war assignments on petroleum and natural gas have been carried out, and the Bureau of Mines has contributed to post-war needs with each achievement because research in this field must be conducted along the same general lines, whether the results be applied in war or peace.

Despite handicaps, war missions were fulfilled on four major fronts: primary extraction of oil, secondary recovery, chemistry and refining, and helium production.

Manpower shortages were encountered, together with difficulties in obtaining equipment needed to test flowing wells, but the Bureau's small staff of petroleum engineers supplied basic knowledge and applied technical skill to the operation of condensate and other types of fields engaged in primary extraction of oil. Five engineering reports on Gulf coast fields and three others on the flow characteristics and properties of the fluids in separate reservoirs were supplied to the Petroleum Administration for War and the operators in response to a need for specific facts and figures, and aided the entire war program. Subsurface surveys were made in two important Rocky Mountain fields to permit the formation of plans to operate them at high rates of production, and research was continued on the effect of well spacing on oil recovery.

To supply more oil for war by secondary recovery—stimulative methods of production in fields where nature no longer drives oil to the wells—Bureau engineers disseminated information of modern engineering practices among the 15,000 oil operators of the Appalachian region; surveyed water-flooding projects in Oklahoma, Kansas, and Illinois; studied air- and gas-injection in Illinois; and collected data, on water flooding of limestone reservoirs, a subject on which little information has been available. Laboratory research continued on mechanical and solvent extraction of oil from impregnated surface and near-surface deposits, and experiments were made on reducing the cost of lifting oil from vertical wells by introducing the use of siphons on properties where air and gas are injected. A report was begun on observations of a project in Venango County, Pa., where horizontal holes are being drilled into the oil sand from a vertical shaft. Many of the Bureau's findings on secondary recovery will prolong the period in which the United States can depend upon natural crude-oil deposits as its main source of petroleum for liquid fuels and chemical products.

Hitherto unknown sources of base stock and high-octane components for blending into aviation gasoline were disclosed by the Bureau's chemical and refining research. This information aided the Petroleum Administration for War and the refiners materially in meeting the needs of war for aviation fuel, toluene used in the manufacture of explosives, and other petroleum products.

More than 40 reports were submitted during the year to the Petroleum Administration for War and others concerned with evaluation of crude oils and base stocks, analyses of naphthas, and improvement of marginal base stock quality. Constituents of asphalts were studied so that they, like those in aviation fuels, may be compounded to meet exacting requirements.

Work undertaken to give industry fundamental data on thermodynamics of hydrocarbons progressed satisfactorily, and combustion heats of 10 hydrocarbons in the lubricating-oil range of petroleum were determined.

A field pilot plant was built and initial tests were made to remove microcrystalline wax from tank bottoms. Used for munitions and other war products, it accumulates at the rate of 3 million barrels a year in the midcontinent area alone.

Laboratory and field tests developed many innovations in mixing and controlling oil-base drilling fluids and aided operators materially in improving the wall-building and water-loss properties of the fluids, thus effecting economies in the use of steel casing.

An oil-shale research program, authorized by the Synthetic Liquid Fuels Act (Public, 290), has increased the scope of the Bureau's research toward making petroleum and its products available at lower cost through more efficient extraction.

Helium

With the completion of three new plants, the helium-production facilities of the Bureau of Mines met all the requirements of the armed forces and made large quantities of this lightweight, noninflammable "miracle" gas available to commercial purchasers for industrial, medical, and experimental uses.

In January 1944, the Bureau's helium plants at Amarillo and Exell, Tex., were awarded the Army and Navy "E" for their outstanding performances.

Quantity production of helium, the gas which gives buoyancy to antisubmarine patrol blimps and meteorological and barrage balloons, has made possible its use as a shield in the welding of magnesium, aluminum, and alloy steel and has changed radically many procedures in fabricating airplanes and other war equipment. Important medical developments dependent upon assured supplies of helium include the elimination of explosion hazards of anesthetics and the alleviation of certain respiratory ailments.

To conserve helium for these and many new uses being developed for the post-war world, the Bureau of Mines is replacing in nature's underground storage vaults excess supplies processed from the natural gas destined for commercial fuel markets. Otherwise, this helium would be lost forever.

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Manpower shortages were encountered, together with difficulties in obtaining equipment needed to test flowing wells, but the Bureau's small staff of petroleum engineers supplied basic knowledge and applied technical skill to the operation of condensate and other types of fields engaged in primary extraction of oil. Five engineering reports on Gulf coast fields and three others on the flow characteristics and properties of the fluids in separate reservoirs were supplied to the Petroleum Administration for War and the operators in response to a need for specific facts and figures, and aided the entire war program. Subsurface surveys were made in two important Rocky Mountain fields to permit the formation of plans to operate them at high rates of production, and research was continued on the effect of well spacing on oil recovery.

To supply more oil for war by secondary recovery—stimulative methods of production in fields where nature no longer drives oil to the wells—Bureau engineers disseminated information of modern engineering practices among the 15,000 oil operators of the Appalachian region; surveyed water-flooding projects in Oklahoma, Kansas, and Illinois; studied air- and gas-injection in Illinois; and collected data on water flooding of limestone reservoirs, a subject on which little information has been available. Laboratory research continued on mechanical and solvent extraction of oil from impregnated surface and near-surface deposits, and experiments were made on reducing the cost of lifting oil from vertical wells by introducing the use of siphons on properties where air and gas are injected. A report was begun on observations of a project in Venango County, Pa., where horizontal holes are being drilled into the oil sand from a vertical shaft. Many of the Bureau's findings on secondary recovery will prolong the period in which the United States can depend upon natural crude-oil deposits as its main source of petroleum for liquid fuels and chemical products.

Hitherto unknown sources of base stock and high-octane components for blending into aviation gasoline were disclosed by the Bureau's chemical and refining research. This information aided the Petroleum Administration for War and the refiners materially in meeting the needs of war for aviation fuel, toluene used in the manufacture of explosives, and other petroleum products.

More than 40 reports were submitted during the year to the Petroleum Administration for War and others concerned with evaluation of crude oils and base stocks, analyses of naphthas, and improvement of marginal base stock quality. Constituents of asphalts were studied so that they, like those in aviation fuels, may be compounded to meet exacting requirements.

Work undertaken to give industry fundamental data on thermodynamics of hydrocarbons progressed satisfactorily, and combustion heats of 10 hydrocarbons in the lubricating-oil range of petroleum were determined.

A field pilot plant was built and initial tests were made to remove microcrystalline wax from tank bottoms. Used for munitions and other war products, it accumulates at the rate of 3 million barrels a year in the midcontinent area alone.

Laboratory and field tests developed many innovations in mixing and controlling oil-base drilling fluids and aided operators materially in improving the wall-building and water-loss properties of the fluids, thus effecting economies in the use of steel casing.

An oil-shale research program, authorized by the Synthetic Liquid Fuels Act (Public, 290), has increased the scope of the Bureau's research toward making petroleum and its products available at lower cost through more efficient extraction.

Helium

With the completion of three new plants, the helium-production facilities of the Bureau of Mines met all the requirements of the armed forces and made large quantities of this lightweight, noninflammable "miracle" gas available to commercial purchasers for industrial, medical, and experimental uses.

In January 1944, the Bureau's helium plants at Amarillo and Exell, Tex., were awarded the Army and Navy "E" for their outstanding performances.

Quantity production of helium, the gas which gives buoyancy to antisubmarine patrol blimps and meteorological and barrage balloons, has made possible its use as a shield in the welding of magnesium, aluminum, and alloy steel and has changed radically many procedures in fabricating airplanes and other war equipment. Important medical developments dependent upon assured supplies of helium include the elimination of explosion hazards of anesthetics and the alleviation of certain respiratory ailments.

To conserve helium for these and many new uses being developed for the post-war world, the Bureau of Mines is replacing in nature's underground storage vaults excess supplies processed from the natural gas destined for commercial fuel markets. Otherwise, this helium would be lost forever.

Explosives

Promoting safety and efficiency in the manufacture and handling of explosives in war and for the peace to come, the Bureau of Mines conducted many research and testing projects for the armed forces and for the mineral industries.

More than 4,000 analyses and tests were made during the year including 220 chemical analyses, about 1,000 gallery tests, and more than 3,000 other control tests. Among the subjects for research were incendiary bombs, artillery shells, practice mines, railroad torpedoes, dynamite mixtures, black powder, camouflage nets, aerosols for control of insects, and defects in carbide specifications and acetylene generator operations.

At the request of such agencies as Army Ordnance, the Army Engineer Board, Chemical Warfare Service, Navy Department, and War Relocation Authority Board of Economic Warfare, problems were solved on the stability of explosives materials under impact, friction, confinement, and high temperatures, and certain conditions of electrical environment and exposure. The hitherto unavailable information was applied immediately in safeguarding essential manufacturing facilities and in designing front-line munitions. While primarily for military explosives and pyrotechnics, the information will be of major importance to the peacetime industry.

To counter fire and explosion hazards, inflammability and explosibility factors were determined for industrial organic chemicals in the tremendously expanded textile, synthetic rubber, and plastic industries which will have major roles in the post-war world. As an imperative wartime construction, control measures were started to curb acetylene-generator explosions which threatened seriously in West Coast shipyard operations.

Diesel mine locomotives, when designed especially to prevent explosions or the development of toxic gas conditions, offer distinct advantages in many mining operations. To encourage their use while maintaining safe conditions in post-war mine development, a schedule was prepared governing the testing and approval of such locomotives. Testing was continued to maintain quality in explosives, particularly those used in coal mining.

SAFETY, PLANT PROTECTION, AND HEALTH ACTIVITIES

Wartime emphasis on the health and accident-prevention projects of the Bureau of Mines to conserve manpower and promote the production of raw materials for armies and fleets has opened a new channel for sweeping advancements in industrial safety when peace returns.

Numerous handicaps—increased production, longer hours, employment of older and inexperienced workers, shortages of repair parts, and inability to obtain replacements for faulty equipment—faced the mineral industries last year, but accident rates in the industry as a whole increased but slightly; in some activities they even declined. Having proven what can be done through intensive safety education, accident-prevention work, investigative and research activities, and by laboratory testing of equipment before use, the Bureau predicts greater achievements in the post-war period when many of the current adverse conditions and handicaps are erased.

Under the Bureau's wartime security programs, safer storage, handling, transportation, and use of explosives evolved from the administration of the Federal Explosives Act. The antisabotage activities of the mineral production security staff were so successful, due to the cooperation of industry, that the program has been curtailed.

SAFETY WORK

With many years of experience at their command, the Bureau's safety experts constituted a foundation for the coal-mine inspection, explosives control, and mineral production security programs, coordinating the administration and directing the field activities of all three in addition to conducting safety education, assisting at mine fires and explosions, and making investigations of accidents and means of preventing them.

Laying the groundwork for a new era of industrial safety after the war, engineers and safety instructors during 1944 trained nearly 25,000 employees of the mining and affiliated industries in first aid, increasing to 1,609,239 the number completing these courses since the Bureau was established in 1910. About 230 persons were trained as first-aid instructors, completing a force of nearly 17,000 qualified to teach Bureau procedures. Certificates were awarded to 40 mines and plants in which all employees had received first-aid instruction, and Bureau personnel aided in conducting 10 first-aid contests in 4 States. Mine-rescue instruction was given to nearly 2,800 mine workers, swelling the ranks of those so trained to 80,504. Familiar with the rescue equipment and safe procedures essential in saving lives when fires, explosions, and other disasters occur, these men form an efficient reserve on call for rescue work and possible civilian defense emergencies.

Assisting in rescue and recovery operations, frequently arduous and dangerous, Bureau engineers investigated 30 mine explosions in 10 States and Alaska, 47 mine fires in 18 States, and 142 miscellaneous accidents in 27 States and Alaska during the year. One Bureau of Mines safety expert lost his life last year during recovery operations following a mine explosion. At the request of the owners, rigid

inspections were made of 75 privately maintained mine-rescue stations.

The Bureau's accident-prevention instruction registered new enrollment gains, complete courses being taken by about 1,600 workers and officials and partial courses by about 670, representing the coal mining, metal mining, and petroleum industries. Motion pictures, slides, exhibits, testing galleries, and other equipment were employed in the safety education program. Sound motion pictures on safety subjects were shown more than 500 times during the year, and Bureau representatives attended more than 600 safety meetings in 37 States.

Continuing its investigations and test work to determine the safety of electrical equipment for use in mines, the Bureau approved 37 complete units and issued 12 letters of suitability concerning separate explosion-proof parts for use on approved equipment. Explosion tests conducted during these investigations totaled nearly 2,000. In addition, about 900 explosion tests were made for the Navy Department on equipment intended for ships and munitions plants, and a special study also was made for the Navy on toxic gases emitted by over-heated electrical conductors.

Safety activities of the Bureau have many ramifications, and numerous special investigations were undertaken to determine the causes of explosions, fires, and asphyxiations in war plants and to help minimize hazards involving various gases and dusts.

COAL-MINE INSPECTION

Despite wartime conditions adversely affecting all safety efforts, fatality rates in the Nation's coal mines have declined to the lowest point in history—indicating the salutary effects of the thousands of improvements in practices and conditions established under the Federal coal-mine inspection program, the success of which hinges on the cooperation and assistance of State inspectors and the aid of mine operators and their employees. At the same time, a reduction in accidents has conserved manpower and aided an industry vitally essential to the prosecution of the war.

From the inception of the Bureau's inspection program on December 1, 1941, to the end of the fiscal year, Federal inspectors had examined nearly 2,500 mines for the first time, reinspected some 1,200 mines once, about 200 a second time, and 3 for the third time. Mines inspected at least once produce a total of nearly 600 million tons of coal and employ about 96 percent of all coal-mine workers. The number of mines inspected each month continued to increase as the inspection force became more proficient and as changes were made in inspection procedure.

The Bureau safety standards for anthracite and for bituminous coal and lignite mines were revised during the fiscal year to cover changed conditions directly related to the war.

The accident-frequency rate in coal mines reinspected by Bureau representatives has declined approximately 6 percent, and it is significant that only one major explosion and one major fire disaster occurred during the first 6 months of 1944 when fatality rates reached their lowest ebb in coal-mining annals. This record was achieved in the face of numerous handicaps: increase in the average age of mine workers from 32 to 45, employment of inexperienced men to replace those lost to war plants and the armed forces, a greater effort by workers resulting in physical and mental fatigue, and a shortage of repair parts and new equipment to recondition or replace worn and unsafe facilities.

The inspection staff and the Bureau's mining-explosive and mining-electrical engineers also maintained a consulting service for small operators confronted with particular safety problems, supervised experimental work on devices and procedures designed to improve safety, conducted experiments on permissible explosives, made special studies in connection with the use of explosives and electricity in mines, and prepared reports and pamphlets on safety subjects for the guidance of the mining industry.

EXPLOSIVES REGULATION

Although millions of pounds of nonmilitary explosives were used by American industries last year, no clear-cut cases of sabotage involving blasting materials were reported to the Bureau of Mines, the Federal agency designated by Congress to maintain strict control over such explosives and their ingredients.

License revocation proceedings were brought against only 16 persons, compared with 40 in the previous year. However, two cases involved possible disloyalty, a question that did not arise in 1943. Most storage violations result from ignorance of Federal requirements. Twelve licenses were revoked, and in some instances fines up to \$300 and prison sentences up to 2 years were imposed.

Administering the Federal Explosives Act through an organization of 4,100 cooperating licensing agents serving without pay, the Bureau by the end of the 1944 fiscal year had approved more than 500,000 licenses, including reissuances. Explosives investigators, aided by other Bureau personnel, reported on approximately 6,000 stores of explosives, and nearly 9,000 letters of instructions were sent to licensees.

To simplify procedures for licensing agents and the public, and to aid in administration, new application and license forms were prepared, amendments to regulations were issued, and the text of the act, regulations, and amendments, together with safety suggestions for handling explosives, were distributed under one cover.

Cooperation maintained with military authorities, the Federal Bureau of Investigation, and State and local law-enforcement officers made the functioning and administration of the program increasingly effective.

ANTISABOTAGE

A record unblemished by a single known case of sabotage during the present war has been maintained by the Nation's mineral industries, cooperating with law-enforcement officers, the armed forces, and the mineral production security program of the Bureau of Mines. In fact, the Bureau's program has been so effective that it now can be modified and the emphasis shifted to prevention of production losses from fires and accidents instead of subversive activities. Personnel has been reduced more than 50 percent, coal-mine security activities have been transferred to the coal-mine inspection staff, and metal-mine security work has been curtailed.

However, at the request of the Provost Marshal General's office, some of the Bureau's specially trained engineers have replaced Army officials in conducting recurring inspections of most mines and related facilities labeled essential by the War Production Board. Accident-prevention courses for supervisory officials of large metal mines and plants also will be continued, together with explosives-magazine inspections.

During the year the Federal engineers inspected nearly 1,000 mines, mills, and smelters and assisted the operators in establishing adequate security standards. They also made more than 1,000 reinspections, visiting some facilities several times to insure the correction of unsatisfactory security conditions and thus aid in maintenance of war-mineral production. Some inspections were made jointly with War Department representatives at mines and related facilities on the Army's "master responsibility list." Hundreds of other mines were visited, and reports were submitted on approximately 2,800 explosives magazines in connection with the Federal Explosives Act.

HEALTH IN THE MINERALS INDUSTRIES

Confidential wartime studies by the Bureau of various precision instruments now protecting the lives of Americans on the Navy's fighting ships and in military establishments will be available to improve

working environments in post-war mineral industries confronted with the huge task of filling deferred civilian demands for materials of all types.

Other advancements of the fiscal year included the development of a new dust-sampling device, improvements in a microprojector to facilitate the collection and determination of the amount of harmful dust in the air, and progress in the application of the X-ray and petrographic methods in analyzing dusts and ores from a health standpoint.

In addition to the development and improvement of apparatus for determining the amount and composition of such atmospheric contaminants as noxious gases, fumes, and dusts, the health work of the Bureau, directed mainly toward preventing occupational disease and improving the efficiency of workers, included studies of properties and sources of atmospheric contaminants, evaluation of the harmful or dangerous character of atmospheric environment, and control of unhygienic conditions.

Inspections were made and recommendations prepared on the hygienic conditions in coal and metal mines, at two Army posts, a steel plant, an engine-manufacturing plant, and an electric power plant. In the laboratory, a research project revealed that toxic and explosive gases are liberated when organic insulating material is decomposed by an electric arc.

In assisting its field and laboratory investigations, the Bureau analyzed approximately 16,000 air samples, involving more than 100,000 determinations, and also tested 555 air samples from fire areas in coal and metal mines. Thirty-eight air and gas analyses were made for the Army and 708 for the Navy, and about 1,000 determinations were required on dust and source material collected during coal-mine inspections and other Bureau investigations conducted to help control health and explosion hazards in mines and plants of the mineral industries.

Approval-testing of all types of respirators continued. Meanwhile, the information collected from 1933 to 1942 during a program of sealing abandoned mines to control acid mine drainage was analyzed to aid in a possible post-war program on this problem. The first draft of an approval schedule for Diesel mine locomotives was completed and was submitted to other Bureau personnel and to industry for critical review.

ECONOMICS OF MINERAL INDUSTRIES

As the United Nations' war machine rolled relentlessly forward to new goals, changes in the production-and-demand scene in mineral commodities, both foreign and domestic, caused war agencies to rely

more heavily on the long-established statistical and economic work of the Bureau of Mines for authoritative information, particularly in the field of foreign minerals. The emphasis on foreign minerals in the post-war era required an increase in the Bureau's staff of foreign mineral specialists.

Threatened coal shortages impelled the Solid Fuels Administration for War to ask for more information on supplies in critical areas and the outlook for production and future demand. All these requests, along with others on primary and secondary metals, chemical raw materials, fertilizers, and petroleum were met speedily.

Governmental efforts to balance mineral supplies against requirements were successful in many instances during the year and, with the exception of fuels, pressure for additional production or conservation was relaxed. For many commodities it was possible even to effect reconversion and post-war problems in which the Bureau's fact-finding services are as essential as they were in planning the war program.

Seeking a more effective organization for the postwar responsibilities of assuring adequate supplies for the anticipated advance in living standards, the Department of the Interior during the year consolidated all of its mineral economic services in the Bureau of Mines.

METALS

Adequate supplies of virtually all metals needed for war and essential civilian uses were assured during the fiscal year by the continued expansion of domestic production and increased imports of base metals and ores. Analyses of the thousands of voluntary reports from industry on production, stocks, and consumption of nearly 400 commodities disclosed a gradual improvement in the supply-demand requirement position of nearly all major war metals, although they declined slightly during the last 6 months of the fiscal year, but due to manpower shortages.

The Bureau of Mines continued to prepare confidential reports on these surveys for the use of war agencies, and war censorship authorities permitted a larger number of these studies to be made public. Invaluable to agencies concerned with war supply problems, the factual monthly and quarterly metal summaries will serve an equally important purpose in the post-war period, and the service will be extended to industry and the public as rapidly as censorship requirements are relaxed.

Disposal of Government-held inventories of metal and minerals present one of the most complex post-war problems. Prepared for peace as it did for war, the Bureau of Mines will be ready to

comprehensive information needed for the solution of this and other reconversion problems, including the status of marginal producers, unemployment resulting from possible curtailment of production, the accelerated depletion of domestic reserves, and the competitive situation between metals.

NONMETALLICS

As in the years past, the Bureau of Mines compiled and distributed periodic reports on commercially important nonmetallic minerals and their primary products. Special emphasis again was given those having critical war uses, and field investigations were made by Bureau specialists when acute shortages developed in some commodities. Reports were prepared on many vital nonmetallic war minerals, including mica, asbestos, sulfur, fertilizers, quartz crystals, graphite, and abrasives.

Markets for building materials dropped sharply as the mobilization program passed from the construction to the production phase; at the same time, the demand for chemical raw materials, fertilizers, and many other nonmetallics reached record heights under the stimulus of war. In consequence, as the year progressed and the supply-demand relationships eased, an increasing number of requests for information bearing on reconversion and post-war problems were received by the Bureau's experts in the field of nonmetallics. Both industry and Government became more aware of the need for market analyses—adequate information on uses, supply, and potential demand—to be used as guides in the establishment of company and public policies. Much of this information is available in chapters of the Bureau's Minerals Yearbook and other published reports, but some amplification will be required to supply additional facts desired by producers and consumers of chemical raw materials, fertilizers, and building materials.

PETROLEUM AND NATURAL GAS

Uniformly essential in providing the basic current and annual reports required by war agencies, the Bureau's normal functions as a storehouse of information on petroleum and natural-gas economics have been expanded and regeared to new and pressing wartime needs.

The most important additions to its work have evolved from the increasing complexity of refinery operations required to fill the demands of the machines and plants of war for fuels, lubricants, and other petroleum products. Monthly surveys on the production and distribution of aviation gasoline were revised and improved. The monthly canvass covering products of natural gasoline and cycle plants, required as blending agents for aviation gasoline and as ma-

terial for synthetic rubber, was enlarged and adjusted to current requirements.

Forecasts of demand for motor fuel and crude oil have supplied an accurate barometer of the wartime changes in national consumption and estimates of the demand for domestic crude petroleum by States of origin have given the Petroleum Administration for War a gage for determining desirable rates of production.

The Bureau has cooperated in preparing reports on the reserves of crude petroleum and natural gas in relation to present and future national supply, and its accumulated information on foreign oil production and international trade has been of outstanding value to agencies concerned with war and post-war supply. Reports and economic studies of the Bureau are of particular aid in interpreting the effect of the war on the long-term trends of the oil and natural-gas industries.

COAL

Continued shortages of anthracite and domestic coke, accelerated demand for metallurgical coke, and increased requirements for light oil and coal-tar derivatives for the manufacture of explosives, synthetic rubber, aviation gasoline, plastics, and pharmaceuticals required that the Bureau of Mines continue special surveys previously initiated, expand others, and inaugurate new studies. This vital information, requested by the War Production Board, Solid Fuels Administration for War, and other war agencies, provided the basis of the program for the equitable distribution of anthracite and permitted control of prices and allocation of coke byproducts to war plants.

Detailed information on production, import and export trade, and solid-fuel requirements of Eastern Europe and North Africa was prepared for the War and Navy Departments; and the well-established weekly, monthly, and annual domestic reports were published during the year, but with some deletions due to censorship regulations.

Effective May 30, 1944, the extensive economics and statistics facilities of the Solid Fuels Administration for War were transferred to the Bureau of Mines, thus expanding the Bureau's coverage to include the economics of the bituminous coal industry. Thus, the Bureau now can give industry and Government virtually complete coal economics service. With minor adjustments, the war program in this field will be essential in helping solve problems of the post-war era.

FOREIGN MINERALS

Being geared for the post-war world, the work of the Bureau of Mines on foreign mineral economics was expanded during the year to include studies of foreign mineral resources with special reference to their importance in international relationships during the next few years.

Information was earmarked for Government agencies responsible for the solution of post-war problems of an international nature, including economic relief and rehabilitation of liberated areas, political and commercial control of world minerals, and equitable distribution of world output. Such pertinent information also is in demand by agencies concerned with the twofold problem of obtaining from foreign sources adequate supplies of minerals not available domestically in sufficient quantities and with adjusting the Nation's mineral procurement program after the war, particularly with Latin American countries.

ACCIDENT AND EMPLOYMENT DATA

Paralleling the annual statistical surveys of mineral production was the Bureau of Mines' Nation-wide canvass of mines, quarries, mills, smelters, and coke ovens to obtain facts on the number and causes of accidents, and the number of employees and man-hours worked.

This information, collected for many years as an essential part of the Bureau's accident-prevention activities, will be equally useful during and after the conversion to peacetime operations.

Using the information during the last fiscal year in formulating military and civilian programs, war agencies found particularly helpful the facts provided on the location of mines producing minerals needed for war, the productivity per man-hour as related to the Government's over-all policy of manpower conservation, the extent of employment at mines and quarries producing minerals unessential to the prosecution of the war, and other facts concerning matters affecting the mineral industry and its absorption of manpower.

This program was elevated to divisional status in the Bureau organization during the year because of the growing importance of accident prevention and the anticipated intensification of efforts to improve the accident record of mineral industries in the post-war period.

PUBLIC REPORTS

Requests from industry, governmental war agencies, and the public for informative material on all phases of the mineral industries continued to increase during 1944. Although many additional reports were published, the number of copies printed and distributed was restricted in keeping with a policy of rigid economy established during the previous fiscal year, and the total volume of pieces issued remained virtually unchanged. The Minerals Yearbook again was classed confidential and was not distributed generally.

In all, 512 bulletins, technical papers, handbooks, Minerals Yearbook chapters, and contributions to technical journals were prepared, together with many hundreds of periodic reports of a statistical nature

to serve industry. Thousands of letters were written in response to mail and telephone requests for information.

The Bureau's Washington library of selected reference material was increased by approximately 2,500 books; about 230 different periodicals, many on an exchange basis, were received regularly; and 25,200 books and periodicals were circulated for use outside the library. In addition to regular accessions, about 3,000 books and pamphlets were being transferred to the library from the Coal Economics Division, which acquired them from Solid Fuels Administration for War. The Washington library now has about 60,000 books.

During the year, some 6,000 readers visited the library for reference work and approximately 6,000 telephone calls were received. Nearly half of both readers and calls were from war agencies and other sources outside the Bureau.

The Bureau's free educational motion pictures, produced with funds contributed by private industry, were shown in the United States and many foreign countries on 93,586 occasions during the year to audiences totaling 7,691,166 persons. Showings in educational institutions decreased, but this decrease was largely offset by increased showings in industrial plants. Since 1922, the Bureau's films have been shown on 1,112,338 occasions to audiences totaling 115,878,059 persons. Seven new sound films were added to the Bureau's library of 10,000 reels.

ADMINISTRATION

As in past years, activities of the Bureau of Mines were administered from Washington, D. C., but were carried on largely in the field offices, laboratories, and pilot plants. For greater efficiency, many payments of salaries and vendor bills were made by the Treasury Department's regional disbursing officers nearest to field projects. Wage board procedures were put into effect at the Electrometallurgical Laboratory in Boulder City, Nev., and at the helium plants at Amarillo and Exell, Tex.; Otis and Cunningham, Kans.; and Shiprock, N. Mex.

PERSONNEL

On June 30, 1944, there were 4,300 full-time employees of the Bureau of Mines, distributed as follows:

Classification and number of appointees

	P&S	SP ¹	CAF	CPC ²	Total
Department.....	137	8	635	5	785
Field.....	705	311	1,055	1,444	3,515
Total.....	842	319	1,690	1,449	4,300

¹ Includes instrument makers, safety instructors, laboratory aids, assistants, etc.

² Includes laborers, mechanics, messengers, etc.

PROPERTY

As of June 30, 1944, the property of the Bureau had a total valuation of \$8,485,533.37, of which \$2,533,869.06 was for land, buildings, and improvements; \$1,681,168.88 for laboratory equipment; \$1,540,665.36 for machinery and power plant equipment; and the remainder for certain helium properties, office furniture and equipment, automobiles and trucks, rescue cars and specialized apparatus, and other goods.

FINANCE

Total funds available to the Bureau of Mines for the fiscal year ended June 30, 1944, including direct appropriations, departmental allotments, reappropriated balances, and sums transferred from other departments for service work, were \$25,476,222. Of this, \$19,821,562 was spent, leaving an unexpended balance of \$5,654,660. These figures are subject to revision because of unpaid obligations.

Table 1 presents classified information regarding the financial history of the Bureau for the fiscal years June 30, 1941-45.

Table 2 gives a statement of the distribution of congressional appropriations to the services and divisions and the expenditure of these funds in 1944 by Bureau divisions.

TABLE 1.—Bureau of Mines appropriations and expenditures, fiscal years ended June 30, 1941-45

Fiscal year	Appropriated to Bureau of Mines	Departmental allotments ¹	Funds transferred from other departments ²	Total funds available for expenditure	Unexpended balances	Total expenditures	Expenditures, exclusive of service items ³
1941.....	\$3,944,400.95	\$91,790	\$2,225,939.10	\$6,262,130.05	\$1,069,298.98	\$5,192,831.07	\$4,934,951.05
1942.....	8,910,388.68	97,490	2,223,026.41	11,230,905.09	1,823,415.21	9,407,489.88	8,747,726.21
1943.....	28,707,630.94	106,450	2,567,615.26	32,168,548.20	5,851,566.64	26,316,981.56	25,178,429.84
1944.....	20,969,098.00	91,300	3,460,898.00	25,476,222.00	5,654,660.00	19,821,562.00	17,962,090.00
1945.....	23,956,639.36	91,300	4,416,853.33	28,464,792.69			

¹ Includes printing and binding, stationery, and contingent funds.

² Includes proceeds from sales of residue gas.

³ Service items include helium, and other investigations and services for other departments.

⁴ Includes \$6,539.10 unexpended balance reappropriated, and balance of \$85,452.95 receipts from sale of helium and other products.

⁵ Includes \$914,718.39 unexpended balance reappropriated, and balance of \$79,002.28 receipts from sale of helium and other products.

⁶ Includes \$976,885.27 unexpended balance reappropriated, and balance of \$128,018.51 receipts from sale of helium and other products.

⁷ Includes \$4,606,720.72 unexpended balance reappropriated, and balance of \$202,723.66 receipts from sale of helium and other products.

⁸ Includes \$4,603,644 unexpended balance reappropriated, and balance of \$291,152 receipts from sale of helium and other products.

TABLE 2.—Bureau of Mines Expenditures, fiscal year 1943

Division or service	Salaries and expenses and expenditures	Operating rescue cars and stations and investigation of accidents	Coal-mine inspections and investigations	Salaries and expenses, enforcement of Federal Explosives Act	Protection of mineral resources and facilities, including petroleum	Testing fuel	Mineral mining investigations	Oil and gas investigations	Purchase of land, etc., Bartlesville, Okla.	Expenses, mining experiment stations	Care, etc., buildings and grounds, Pittsburgh, Pa.	Economics of mineral industries	Investigation of raw material resources for steel production
Office of the Director.....	\$28,951	\$598	\$22,989	\$4,958	\$9,726	\$10,125	\$9,608			\$221,740		\$653	\$10,235
Office of Minerals Reports.....		8,711											
Total.....	28,951	9,309	22,989	4,958	9,726	10,125	9,608			7,625		653	10,235
Administrative Service.....	444,783	24,425	15,870	48,288	10,316	9,468	1,641	\$21,906		11,943		37,549	36,729
Mining and Metallurgical Service.....							82,805			19,924			30,830
Central Region.....							13,743			35,447			516,080
Eastern Region.....		40,787	12,831	3,391	1,647	18,376	115,541			224,901	\$134,205		827,936
Western Region.....							198,209			296,305			527,347
Fuels and Explosives Service:													
Fuels Division.....		103,726	16,879	6,524		376,278	1,377			611	4,577		28,047
Explosives Division.....		94,456		69,546									
Petroleum and Natural Gas Division.....								542,550	\$23,975				
Total.....		198,182	16,879	76,070		376,278	1,377	542,550	23,975	611	4,577		28,047
Economics and Statistics Service:													
Coal Economics Division.....												41,077	
Foreign Minerals Division.....												44,853	
Metal Economics Division.....												115,691	
Mineral Production and Statistics Division.....												133,809	
Nonmetals Economics Division.....			19,189									79,710	
Petroleum Economics Division.....												56,017	
Total.....			19,189									491,157	

TABLE 2.—Bureau of Mines expenditures, fiscal year 1944—Continued

Division or service	Construction and equipment of development laboratory	Gaseous and solid fuel reduction of iron ores	Management of beneficiated solid fuel reduction of iron ores	Production of alumina from low-grade bauxite and alumina	Investigation of bauxite and alunite ores and alumina deposits	Magnetite plot plants and re-search	Investigation of critical and essential minerals in the United States and its possessions	Drainage tunnel, Leadville, Colo.	Helium production	Construction and equipment of helium plants	Protection of experimental mine property from mine fire	Reduction of zinc concentrates with methane gas	Development of processes for recovery of waste materials
Office of the Director	\$1,331	\$5,091	\$7,837	\$943	\$13,249	\$487 960	\$206 28,647			\$311			
Office of Mineral Reports	1,331	5,091	7,837	943	13,249	1,447	28,853			311			
Total	364 7,794	15,183 46,933 193,058 108,145	26,824 9,921 50,442 26,202 710,788	18,432 7,696 76,591 321,765 150,387	28,476 18,486 1,033,686 278,923 141,032	10,515 78,618 23,473 42,114 152,300	76,899 121,592 1,145,070 815,994 1,662,623	20,455 10,058 30,513	\$11,179 3,166	\$25,756 37,487		\$703 3,475 21,096	\$15,352
Administrative Service													
Mining and Metallurgical Service													
Central Region													
Eastern Region													
Western Region													
Fuels and Explosives Service													
Fuels Division													
Explosives Division													
Petroleum and Natural Gas Division									1,035,667	1,032,409			
Total									1,035,667	1,032,409	31,090		
Economics and Statistics Service													
Coal Economics Division													
Foreign Minerals Division													
Metal Economics Division													
Mineral Production and Statistics Division													
Nonmetals Economics Division													
Petroleum Economics Division													
Total													

TABLE 2.—Bureau of Mines expenditures, fiscal year 1944—Continued

Division or Service	Experimental plant for synthesis of motor fuel, Pittsburgh, Pa.	Development and operation of helium properties (special fund)	Maintenance: Bureau of Ships of Ships	Emergency fund for the President, national defense (allotment to Interior, Bureau of Mines)	Emergency fund for the President, national defense (allotment to Interior, Office of Secretary)	Salaries and expenses, Solid Fuels Administration for War	Working funds	Printing and binding	Contingent	Total
Office of the Director.....						\$147		\$891 4, 477		\$31, 354 147, 402
Office of Mineral Reports.....										
Total.....						147		5, 368		178, 756
Administrative Service.....		\$500				1, 096		6, 378	\$6, 266	529, 067 384, 307
Mining and Metallurgical Service.....								2, 927		2, 984, 588
Central Region.....								1, 947		3, 074, 970
Eastern Region.....								5, 792		5, 947, 857
Western Region.....										
Fuels and Explosives Service:										
Fuels Division.....	\$927			\$3, 756		162, 660	\$571, 216 5, 967	13, 589 4, 025		1, 341, 712 173, 994
Explosives Division.....		52, 884					1, 452	2, 102		2, 701, 097
Petroleum and Natural Gas Division.....										
Total.....	927	52, 884		3, 756		162, 660	578, 635 19, 716			4, 216, 803
Economics and Statistics Service:										
Coal Economics Division.....						126, 123		309		167, 569
Foreign Minerals Division.....								53		44, 906
Metal Economics Division.....								1, 512		234, 278
Mineral Production and Statistics Division.....							117, 075	32, 278		205, 278
Nonmetals Economics Division.....								950		80, 660
Petroleum Economics Division.....								145		56, 162
Total.....						126, 123	117, 075 35, 307			788, 851
Health and Safety Service:										
Coal-Mine Inspection Division.....					\$32, 512			3, 865		688, 794
Safety Division.....			\$12, 487	110				1, 645		430, 099
Health Division.....								800		109, 180
Mineral Protection Division.....										362, 815
Explosives Control Division.....										424, 575
Total.....			12, 487	110	32, 512			6, 310		2, 016, 363
Total appropriations.....	1, 027	344, 626	12, 500	5, 738	35, 392	350, 668	954, 926	85, 000	6, 300	25, 476, 222
Total expenditures.....	927	53, 474	12, 487	3, 866	32, 512	290, 026	695, 710	82, 845	6, 266	19, 821, 562
Balances.....	100	1 291, 152	13	1, 872	2, 880	69, 642	1 259, 216	2, 155	34	5, 654, 660

1 Available for expenditure in fiscal year 1945.

Geological Survey

W. E. WRATHER, Director



MODERN wars are not won by a single battle or even on a single front. Though each battle must be fought with vigor and the intent to win, the planning staff and the field command would indeed be short-sighted if they squandered on one engagement too much of their power in men and munitions. On the contrary, they must plan for an entire campaign, must hold in reserve the forces that will be required for other battles, and, by endeavoring to hold the initiative, must gradually evolve a broad strategic pattern that will lead to final victory. Both the intelligence service and the planning staff must focus much thought on future engagements far behind the enemy's present lines.

The Geological Survey must endeavor to be similarly forward-looking.

Of necessity, most of the Survey's energy since Pearl Harbor has been devoted to immediate objectives—the many tasks that contribute directly to the winning of the war. Those tasks have included investigations, both in this country and abroad, of sources of the metals, minerals, and fuels that must be made available in seemingly endless amounts to provide the munitions and machines of war; the research for and preparation of confidential technical reports on foreign combat terrains, required by the military planning staffs and the fighting forces; the analysis of complex problems of water supply for military installations and for plants engaged in making the implements of war; and the mapping of millions of square miles in this country, in Alaska, and on other continents, to provide the countless maps needed by the armed forces and by our military and commercial planes in world-wide air-transport service.

However, the Survey has endeavored to plan and execute its work in such manner that the results would not only meet the day-by-day war

TABLE 2.—Bureau of Mines expenditures, fiscal year 1944—Continued

Division or Service	Experimental plant for synthesis of motor fuel, Pittsburgh, Pa.	Development and operation of helium properties (special fund)	Maintenance, Bureau of Ships	Emergency fund for the President, national defense (allotment to Interior, Bureau of Mines)	Emergency fund for the President, national defense (allotment to Interior, Office of Secretary)	Salaries and expenses, Solid Fuels Administration for War	Working funds	Printing and binding	Contingent	Total
Office of the Director.										
Office of Mineral Reports						\$147		\$891 4,477		\$31,354 147,402
Total						147		5,308		178,756
Administrative Service										
Mining and Metallurgical Service		\$590				1,096		6,378	\$6,266	529,067 384,307
Central Region										2,984,888
Eastern Region								2,027		1,947
Western Region								5,792		3,074,970 5,647,857
Fuels and Explosives Service:										
Fuels Division	\$927			\$3,756		162,660	\$571,216 5,967 1,452	13,589 4,025 2,102		1,341,712 173,984 2,701,097
Explosives Division		52,884								
Petroleum and Natural Gas Division										
Total	927	52,884		3,756		162,660	578,635	19,716		4,216,803
Economics and Statistics Service:										
Coal Economics Division										
Foreign Minerals Division						126,123		309		167,569
Metal Economics Division								53		44,906
Mineral Production and Statistics Division							117,075	1,512		234,278
Nonmetals Economics Division								32,278		205,276
Petroleum Economics Division								990		80,660
Total						126,123	117,075	145		56,162
Health and Safety Service:								35,307		788,851
Coal-Mine Inspection Division										
Safety Division					\$32,512			3,865		688,794
Health Division		\$12,487		110				1,645		430,999
Mineral Protection Division								800		109,180
Explosives Control Division										362,815
Total										424,575
Total appropriations				110	32,512			6,310		2,016,369
Total expenditures	1,027	344,026 53,474	12,500 12,487	5,796 3,866	35,309 32,512	355,888 290,023	954,925 683,710	85,000 82,940	6,300 6,266	25,876,222 19,534,060
Balance	100	1,201,152	13	1,872	2,880	69,642	1,250,210	2,155	34	5,054,060

1 Available for expenditures in fiscal year 1945.

Geological Survey

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However, the Survey has endeavored to plan and execute its work in such manner that the results would not only meet the day-by-day war

demands but would also be of greatest usefulness in the campaigns yet to come. Its engineers and scientists must be, and within the limits of its present means are, an "intelligence service" for the far-sighted gathering of basic information needed now and in the future by the Nation's "planning staff," both governmental and private.

To achieve an enduring peace this Nation is pouring out its wealth of manpower and resources without stint or hesitation. When peace comes this country must assume its part in rebuilding a war-torn world. Even now, Federal and State Governments and industry are devoting serious thought to plans for demobilization, reconversion, and post-war development. For the conception and perfection of sound plans, as well as for the later successful accomplishment of many public and private development projects, those planning agencies must have access at the earliest possible time to all needed information on our mineral resources, which have been seriously depleted by war demands; on the flow of rivers and the amounts of surface and underground waters that can be made available for municipal and industrial uses and for irrigation, flood-control, and power projects; and on the nature of the terrain as shown with engineering accuracy on detailed topographic maps.

The gathering of such information and the preparation of reports and maps are functions of the Geological Survey. Much material is already available through the work of earlier peacetime years; other material has been gathered as a byproduct of its urgent war studies but is still largely undigested and not generally accessible; and many investigations and surveys remain to be made. If the planners for post-war reconstruction are not to be gravely handicapped but are to have the fundamental information available in time to be of value, the Geological Survey should be enabled to proceed at once with the full analysis and coordination of the data now in its files and with the most pressing of the additional investigations and surveys. To postpone these tasks until the end of the war would be extremely short-sighted, if not disastrous. They should be undertaken immediately, for they are fully as urgent and practical as the direct war jobs that must be continued.

GEOLOGIC BRANCH

During the past year the Geologic Branch has been fully on a war basis. For the duration this situation will necessarily continue, but it is essential that plans be prepared now to adjust the Branch's work to assist in solving the problems that will face this country in the post-war period and to orient the war work, insofar as that is possible, in such ways as will permit its results to contribute also to the conversion period. The normal demand for minerals, greatly accelerated by war activities, has resulted in an alarming depletion of the supply of many of the basic materials upon which our economy is built. As the richer deposits of minerals are exhausted, more reliance must be

placed on exploration for deposits that are concealed or only obscurely indicated, on deposits of lower grade, and on improved technique in recovering those lower-grade materials. Industry is primarily interested only in those resources that can be exploited at a profit and in peacetime pays scant attention to large reserves of ores and minerals that are below commercial grade. Yet in times of national emergency these low-grade deposits may be the only available sources of vitally needed raw materials. It is a function of the Geological Survey to keep an inventory of all reserves of mineral commodities. During the year Survey geologists have completed the examination of many hundreds of deposits and made preliminary estimates of the national reserves of some 15 or 20 mineral commodities. This inventory should be kept current and broadened.

The rapid depletion of our supplies of petroleum, natural gas, and coal is a matter of grave national concern. The Survey, with its skilled force of geologists, paleontologists, chemists, and petrographers, is the organization best qualified to carry out basic field studies on the stratigraphy and geologic structure of large areas to discover and define those wherein it may be profitable to prospect for new supplies of mineral fuels. These studies should be still further expanded as promptly as possible.

WAR MINERALS

For the 3 years prior to the summer of 1942, principal emphasis was placed by the Geologic Branch upon the search for and appraisal of domestic deposits of the metals and minerals originally classified by the Army and Navy Munitions Board as "strategic" and "critical." With the success of the antisubmarine campaign through the winter of 1942-43 large imports of these commodities began to arrive regularly, and by the fall of 1943 the pressure for domestic production of some of them began to ease. It became apparent, however, that domestic reserves of some of the common metals were being seriously depleted, and geologic personnel was gradually shifted from work on some of the original "strategic" metal deposits to work in districts that held out hope for developing noteworthy new reserves of the common metals. Attention was focused on such zinc districts as Metaline, Wash., Pioche and Goodsprings, Nev., Eureka, Utah, southwestern Wisconsin, and eastern Tennessee, and on the copper districts in the Foothills Belt, Calif., Globe, Ariz., and Michigan. In most of these districts the Geological Survey's work led to recommendations for exploration by the Bureau of Mines, which has been especially successful in Washington, Wisconsin, and eastern Tennessee. Work has been continued in many strategic metal districts to complete studies initiated earlier and to obtain data currently desired by the war agencies, as in the southeastern and western manga-

nese districts; the Almaden and Oat Hill mercury deposits, California; the tungsten districts of Pine Creek, Calif., Mill City, Nev., and Yellow Pine, Idaho; and the vanadium districts of southeastern Idaho and Colorado-Utah.

The object in studying bauxite deposits has been twofold—to relieve the critical shortage of this, the only commercial source of aluminum, by aiding private companies in discovering and delimiting new areas, and to give an accurate appraisal of our resources so that they can be used more wisely in the post-war period as well as in the war emergency. Detailed surveys of areas containing bauxite were continued in nine areas in the Gulf Coastal Plain. Final reports, with geologic and prospecting maps, have been submitted for all these areas except Arkansas, where drilling and mapping is still in progress, and for part of Mississippi, a report on which is still in a preliminary stage. In Saline and Pulaski Counties, Ark., the cooperative drilling program of the Geological Survey and the Bureau of Mines during the fiscal year 1943-44 delimited more than 11 million tons of bauxite of commercial grade.

The search for sources of aluminum and magnesium covered the country from coast to coast and included studies of deposits of alunite, high-alumina clay, magnesite, dolomite, and brucite, in addition to the intensive work on bauxite. More than 250 pegmatite deposits containing sheet mica, beryllium, tantalum, lithium, and feldspar were examined in 13 different States, and recommendations were made to the Bureau of Mines for further exploration of a number of these deposits. Other nonmetallic mineral deposits studied included talc, graphite, salt, potash, asbestos, corundum, and quartz crystals.

Studies of iron-ore deposits were carried on in more than 50 separate areas in 20 States. Some of this work was done in cooperation with other Federal and State bureaus or at the specific request of other Government agencies. Work was carried ahead to obtain information that will be essential to insure a supply after the war, when deposits of inferior quality and small reserves may become producers. Investigations of districts in which appreciable reserves appear to be indicated included those made in the Iron River and Crystal Falls districts of Michigan, the Adirondack region of New York, and the Highlands region of New York-New Jersey.

Owing to greatly increased demands for fluorspar for war uses, consequent depletion of national resources, and likely continuance of an augmented demand for new civilian purposes after the war, fluorspar investigations were pushed energetically and enlarged. In addition to the three established parties working in (1) the Kentucky-Illinois district and Tennessee, (2) Colorado, Idaho, Wyoming, and Washington, and (3) New Mexico, Texas, and Arizona, a fourth party was organized to take charge of work on fluorspar in Utah, Nevada, and

California. Temporary parties were assigned to work in northwestern New Mexico and in Montana and northern Idaho.

In the field of mineral fuels attention was directed primarily to the search for new supplies of petroleum. Regional studies were initiated in 23 States to obtain data on the distribution of possible oil-bearing formations and to locate broad areas where conditions in these rocks might be favorable for the accumulation of petroleum. Nearly 100 geologists were engaged in these expanded activities at the end of the year. Ten preliminary maps and charts giving the results of these studies were issued during the year, and others are in preparation. The petroleum investigations, though stimulated by the war and aimed toward the discovery of war fuel supplies, yield basic geologic data of lasting value in the future search for oil and many other natural resources.

Tar sands and asphalt deposits that have considerable potential importance as sources of petroleum were mapped in Oklahoma and California, and preliminary examinations were made of deposits in many other States. This work was conducted in part in collaboration with the Petroleum Administration for War and the Bureau of Mines.

Examination of coal deposits was confined mainly to areas in the West, where expanded war activities have increased the demand for coking and steam coal. Detailed mapping of coal beds was undertaken in Colorado, Nevada, Oregon, and Alabama in conjunction with exploratory drilling by the Bureau of Mines. Coal deposits were also studied in Oklahoma and Washington.

The sections of Chemistry and Physics, Paleontology and Stratigraphy, and Petrology devoted their time mainly to the laboratory study of materials collected by the field geologists who needed this information in the solution of their war minerals supply problems. In the chemical laboratory more than 8,000 tests and analyses were made, and new techniques were developed for field and laboratory determination of many of the rarer elements that have come to have new and secret, either actual or potential, war uses.

AMERICAN REPUBLICS

Investigations of strategic and critical minerals in the American Republics continued. The work was financed in about equal proportions by the Department of State and the Foreign Economic Administration. Close and cordial cooperation continued with Mexican, Cuban, and Brazilian geological agencies, and cooperative field work was begun with the newly formed Bureau of Mines of Haiti and with the minerals agencies in Chile and the Dominican Republic.

Recently discovered aluminous deposits in Haiti were examined, and prospecting was done in the Dominican Republic for similar deposits. Investigations of chromite and manganese deposits in Cuba

were continued. In Mexico work on fluorspar, copper, mica, mercury, antimony, manganese, and tungsten was carried on in collaboration with the Instituto de Geología, the Dirección de Minas y Petróleo, and the Commission for the Investigation of Mineral Resources. In Brazil investigations of the mica deposits of Minas Geraes were carried on in cooperation with the Departamento Nacional da Produção Mineral and the United States Purchasing Commission. Investigations of mercury and tungsten deposits in Chile were commenced in cooperation with the Chilean Department of Mines. Survey geologists on detail to the Foreign Economic Administration continued investigations of the resources of Colombia, Guatemala, Nicaragua, and Honduras.

The eruption of the new volcano, Parícutin, in Michoacán, Mexico, provided an opportunity to make many observations of considerable scientific interest.

MILITARY GEOLOGY

During the fiscal year 1943-44, the Military Geology unit has continued to prepare terrain intelligence reports for the Military Intelligence Division, Corps of Engineers, and at their request has increased its staff of professional scientists from 30 to 67. The staff now includes several soils scientists and a forester. At the request of the commander of the Southwest Pacific theater, 4 of these military geologists and 1 soils scientist were assigned to headquarters in Australia to prepare similar reports needed for the planning and conduct of combat operations.

Although virtually all the work of this unit was devoted to the prosecution of the war, several byproducts of post-war usefulness have been planned and, in part, developed. These include atlases of the geology and mineral resources of many foreign countries; a topographic or terrain atlas; an appraisal of the completeness of information in the fields of the earth sciences in the whole Pacific area; and a report that will define the field of engineering geology, including military geology. Plans also were outlined for peacetime continuation of liaison between the Geological Survey and the War and Navy Departments.

ALASKAN BRANCH

Many years ago Patrick Henry in one of his orations reflected the then current idea of the remoteness of lands in what is now Michigan when he described them as "beyond the most distant wilderness and remote as the moon." Seventy-five years ago our grandsires probably thought in somewhat the same terms of Alaska. Indeed, even in the early 1890's it was a venturesome pioneer who was willing to brave the unknown conditions that must be met in casting his lot with the few settlers that then occupied this northland. Now that we have learned

more about Alaska and are more familiar with the details of how its development has taken place we have become increasingly aware that the winning of the great northwest province has been merely a reenactment of the various steps by which the States have come to their present stages. In Alaska some of these steps are now being taken at greatly accelerated rates, because modern tools and devices facilitate the overcoming of many of the handicaps hitherto imposed by distance and time. No longer is there need to rely on slowly plodding ox teams to cross seemingly limitless plains and bring in supplies and settlers to the remote corners of the domain, or to wait for weeks to elapse in the exchange of communications, or to depend solely on man's strength to perform necessary labor. Instead airplanes, radios, and mechanical devices can perform these various acts quickly and effectively.

However, no matter whether the rate is fast or slow, true progress in any development depends on thorough knowledge of the problems involved. Many mistakes in past practices and in formulating our national policies have arisen through inadequate or incorrect information as to the pertinent facts. Wise laws cannot be enacted and put into operation for the conservation and proper utilization of the Nation's potential resources without adequate knowledge of the geographic and geologic factors involved. Businessmen, investors, and workers cannot fulfill their roles in undertaking enterprises without dependable authoritative data. The selection of sites for business and industrial centers, for transportation lines to serve them, for sources of power to operate the various appliances and services now regarded as necessary by civilized man are all closely tied to the physical features of the country, as expressed in terms of its geography and geology. Even the most casual consideration of most projects calls for analysis of many of these factors.

If, then, the pattern of Alaskan development so far has followed closely that of the States, it seems inevitable that its fuller development may also be expected to follow the more advanced developments in the States. With confidence that this expectation is valid, it behooves us to learn and apply the lessons of the past as well as add to our store of knowledge.

What are the services that the Alaskan Branch of the Geological Survey is prepared to furnish? Full answer to this question would require far more space than can be given here. Therefore, let a few examples suffice to illustrate some of the broader aspects of its work.

Consider the Survey's mapping program for Alaska. This program provides for the complete topographic mapping of the Territory. The resulting maps show lakes and rivers in true position and relation to other features; settlements, roads, railroads, houses, and other works of man; and the character of the terrain—the height of hills and depth of valleys. From such maps, measurements of the direction and dis-

tance between places and things are easily and accurately accomplished; gradients along prospective routes for railroads or roads may be compared; the areas above or below sites for catchment or utilization of water may be computed; special information, such as the distribution of timber and agricultural developments, can be plotted; and military maneuvers can be planned.

No less essential but perhaps less well known than the topographic maps are the geologic maps and reports covering parts of Alaska issued by the Geological Survey, which portray and describe the geologic features of various areas. These maps and the geologic reports are indispensable to those whose business involves knowledge of mineral deposits—their location, their mineral content, and their geologic features, which, when understood, may guide operators in their search for extension of known deposits or lead them to discovery of new ones.

Perhaps a clearer idea of the application of these various studies may be gained by considering typical inquiries about Alaska received recently from various governmental agencies, such as the War and Navy Departments, War Production Board, and Petroleum Administration for War, and from citizens and companies throughout the country. One inquirer wants to know about the character, distribution, and extent of permanently frozen ground as affecting problems of construction; another inquires about the quality and quantity of asbestos or some other mineral in a remote part of the Territory; another would like to know the location of mines at which he might find work; another asks for details of the terrain in certain of the Aleutian Islands; another asks whether certain lands are available for entry as coal lands; and another asks what materials are available near a specified point for supplying a new plant for making cement. Many inquiries are for identification of place names not found on generally accessible maps; others are for identification and information as to the mineral content of specimens of rocks; and innumerable inquiries relate to the availability of water supplies for various purposes. Still other requests are for photographs and reports useful in teaching about Alaska or of general educational value relative to its magnificent glaciers, volcanoes, and other natural wonders.

From the foregoing examples of the services that the Alaskan Branch is called on to render it is apparent that utilization of the Survey's assistance should precede any thoughtful analysis of the worth-whileness of most development enterprises. The set-up of the Survey's activities in Alaska to meet post-war conditions must not await the cessation of hostilities, because most post-war plans involving the development of our natural resources and the utilization of our country's physical features should not even be considered until this basic factual material is available. Because of lack of infor-

mation on the geology and geography of Alaska in the past lives have been lost, worth-while enterprises have been laid aside, and contributions of matériel to the Nation's defense and welfare have been far less than they might have been. Now is none too soon to remedy some of these lacks, whether we face years of additional warfare or are planning for America's eventual after-the-war resumption of national leadership.

The principal new field projects that were undertaken during the season of 1943 to furnish information needed in the Nation's war plans dealt with the general supervision and gathering of information on mineral resources in the five principal regions into which Alaska may be divided; namely, southeastern Alaska, Copper River-Prince William Sound, Cook Inlet-Alaska Railroad belt, Kuskokwim, and western Alaska. Specific investigations were in progress in each of these regions. In southeastern Alaska search was made for molybdenite ores in areas adjacent to Prince of Wales Island; for chromium and nickel ores near Cross Sound and Lituya Bay; for copper-iron ores on Kasaan Peninsula; for lead-zinc ores near Wrangell; and for basic intrusive and magnetic rocks at a number of localities. In the Copper River-Prince William Sound region, in addition to a general examination of most of the old copper-producing localities, intensive search for copper deposits was carried on in the Nizina and Kotsina-Kuskulana districts and at Rua Cove. In the Cook Inlet-Alaska Railroad belt specific projects involved intensive examination of parts of the Matanuska-Moose Creek coal fields, of coal deposits near Costello Creek, of the tungsten deposits near Fairbanks, of lead and zinc ores near Mount Eielson, and of the chromite deposits near Seldovia. In the Kuskokwim region the individual projects included detailed studies of the quicksilver deposits near Decourcy Mountain and reconnaissance of the quicksilver deposits near Cinnabar Creek in the Holitna Valley. In western Alaska investigations were continued on the tin resources of western Seward Peninsula and in the Morelock Creek area of the Yukon Valley, and preliminary studies were made of tungsten deposits near Nome and Solomon, of graphite in the Kigluaik Mountains, of asbestos near Shungnak, and of quartz crystals in the Koyukuk Valley.

For the field season of 1944 the same general supervision of the work in the various regions was maintained. The emphasis that was being placed on discovery of oil in Alaska, however, led to establishing a separate unit to handle all projects having to do with that work, irrespective of their geographic location. Petroleum investigations are in progress in five areas—near Yakataga, Katalla, Iniskin, on the Alaska Peninsula, and in northern Alaska. The Alaskan projects involving other mineral commodities are the following: In south-

eastern Alaska investigations are continuing of the copper-iron deposits near Kasaan, Tolstoi, and Copper Mountain, and of lead and zinc deposits in the vicinity of Tracy Arm. In the Copper River region examination is being made of molybdenum-copper deposits in the vicinity of Nabesna. In the Cook Inlet-Alaska Railroad belt contact is being maintained with a number of miscellaneous prospects that are in course of development, and intensive examinations are under way in both the Matanuska and the Healy River coal fields. In the Kuskokwim region general scouting of areas regarded as likely to contain significant deposits of quicksilver minerals is being continued, and a reconnaissance of the reported ore deposits in the Russian Mountains is being made. In western Alaska a reconnaissance is being made of the coal deposits adjacent to Yukon River from Ruby to Kaltag and near Unalakleet on Norton Sound, the investigation of tin deposits in western Seward Peninsula will be continued, and examinations will be made of certain mineral deposits that have been reported near Shungnak, in the Kobuk Valley.

In addition to these projects a large part of the activity of the Branch has been devoted to the extended mapping program being carried on at the request of and with funds provided by the Army Air Forces. This project, which originally was more or less restricted to mapping parts of Alaska, has proved so useful that gradually it has been expanded to include the mapping of large strategic areas in other countries. At the close of the fiscal year the Alaskan Branch had completed from aerial photographs planimetric maps covering nearly 5,500,000 square miles and, as part of the same project, topographic maps covering 500,000 square miles.

TOPOGRAPHIC BRANCH

The headquarters offices of the Topographic Branch and its Atlantic Division are located in Washington, D. C.; the headquarters office of the Central Division is in Rolla, Mo.; and that of the Pacific Division is in Sacramento, Calif. Section offices are maintained in Chattanooga, Tenn., and Clarendon, Va.

GENERAL OFFICE WORK

During the year the regular program of cooperative mapping was carried on with 17 States, Puerto Rico, and the Tennessee Valley Authority, but the Topographic Branch directed a large part of its activity to producing maps for the War Department in both domestic and foreign areas. Many field engineers were detailed to this assignment, which included the revision by means of aerial photographs of maps of foreign territory covering approximately 26,000 square miles and the compilation of contour maps from older hachured maps cover-

ing 13,000 square miles. Existing maps for an area of 43,000 square miles were assembled in changed format and re-drafted. A considerable amount of map shading on scales of 1:1,000,000 and larger was done for special use of the Army Air Forces. This work for the War Department is in addition to that reported by the Section of Photomapping.

Section of Computing.—The office processing of control surveys made for the topographic mapping of strategic areas continued in unusual volume during the year. These computations and adjustments resulted in the issue of lithographed lists of leveling, transit traverse, and triangulation results for 70, 186, and 12 quadrangles, respectively. Bulletin 930-D was published during the year, the fourth and last part of spirit leveling in Illinois. Manuscript was prepared in part for a bulletin on spirit leveling in North Carolina. Computations and adjustments for routine field projects were continued, and the usual volume of control data was assembled and transmitted to comply with requests from field engineers and correspondents.

Section of Photomapping.—This section maintains offices in Washington, D. C., Clarendon, Va., Chattanooga, Tenn., Rolla, Mo., and Sacramento, Calif. Its principal work is the production of topographic maps from aerial photographs by stereophotogrammetric methods and the production of planimetric maps and planimetric bases for topographic field surveys by both stereophotogrammetric and graphic methods.

Topographic maps of areas in the United States produced during the year by these methods covered approximately 7,120 square miles; planimetric and base maps covered approximately 13,900 square miles. Topographic maps of foreign areas were produced from aerial photographs for the War Department; of these, maps covering approximately 10,000 square miles were completely processed for reproduction, and maps covering 2,700 square miles were delivered in manuscript form. These figures do not include work performed in the Chattanooga office, which is engaged on a cooperative project with the Tennessee Valley Authority and the War Department.

At the principal office of the section, in Clarendon, Va., in addition to the large production facilities, which are operating on a two-shift basis, there are also maintained a central laboratory for designing, testing, repairing, and adjusting all types of special optical and mechanical equipment utilized for our stereophotogrammetric work and a photographic laboratory specializing on research and precision photography required for the other offices.

The Washington office maintains a general file of aerial photographs utilized in the work of the Geological Survey and of aerial photo-

eastern Alaska investigations are continuing of the copper-iron deposits near Kasaan, Tolstoi, and Copper Mountain, and of lead and zinc deposits in the vicinity of Tracy Arm. In the Copper River region examination is being made of molybdenum-copper deposits in the vicinity of Nabesna. In the Cook Inlet-Alaska Railroad belt contact is being maintained with a number of miscellaneous prospects that are in course of development, and intensive examinations are under way in both the Matanuska and the Healy River coal fields. In the Kuskokwim region general scouting of areas regarded as likely to contain significant deposits of quicksilver minerals is being continued, and a reconnaissance of the reported ore deposits in the Russian Mountains is being made. In western Alaska a reconnaissance is being made of the coal deposits adjacent to Yukon River from Ruby to Kaltag and near Unalakleet on Norton Sound, the investigation of tin deposits in western Seward Peninsula will be continued, and examinations will be made of certain mineral deposits that have been reported near Shungnak, in the Kobuk Valley.

In addition to these projects a large part of the activity of the Branch has been devoted to the extended mapping program being carried on at the request of and with funds provided by the Army Air Forces. This project, which originally was more or less restricted to mapping parts of Alaska, has proved so useful that gradually it has been expanded to include the mapping of large strategic areas in other countries. At the close of the fiscal year the Alaskan Branch had completed from aerial photographs planimetric maps covering nearly 5,500,000 square miles and, as part of the same project, topographic maps covering 500,000 square miles.

TOPOGRAPHIC BRANCH

The headquarters offices of the Topographic Branch and its Atlantic Division are located in Washington, D. C.; the headquarters office of the Central Division is in Rolla, Mo.; and that of the Pacific Division is in Sacramento, Calif. Section offices are maintained in Chattanooga, Tenn., and Clarendon, Va.

GENERAL OFFICE WORK

During the year the regular program of cooperative mapping was carried on with 17 States, Puerto Rico, and the Tennessee Valley Authority, but the Topographic Branch directed a large part of its activity to producing maps for the War Department in both domestic and foreign areas. Many field engineers were detailed to this assignment, which included the revision by means of aerial photographs of maps of foreign territory covering approximately 26,000 square miles and the compilation of contour maps from older hachured maps cover-

ing 13,000 square miles. Existing maps for an area of 43,000 square miles were assembled in changed format and re-drafted. A considerable amount of map shading on scales of 1:1,000,000 and larger was done for special use of the Army Air Forces. This work for the War Department is in addition to that reported by the Section of Photomapping.

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The Washington office maintains a general file of aerial photographs utilized in the work of the Geological Survey and of aerial photo-

graphic negatives that have been purchased under photographic contracts. Through this office contacts are maintained with other governmental agencies involved in aerial photographic work.

Section of Cartography.—The Topographic Branch cooperated with the Army Air Forces in preparing aeronautical charts, work on which was performed in the Section of Cartography. Cooperation with the Public Roads Administration was continued, with the result that 31 sheets of road maps were prepared and submitted for reproduction.

Work on the International Map of the World on a scale of 1:1,000,000 was continued. Sheets I-18 (Hatteras), K-10 (Mount Shasta), K-17 (Lake Erie), and L-10 (Cascade Range) were in progress, and Sheet K-16 (Chicago) was in course of publication at the end of the year.

Section of Inspection and Editing.—During the year 224 quadrangle maps were edited for publication, 164 of which were for multicolor photolithography and 60 for engraving; 362 quadrangle maps, 21 State maps, and 4 State index maps were prepared and edited for reprint editions; 206 maps and diagrams that had been prepared as illustrations for geologic reports were edited; and 528 proofs of all kinds were read. On June 30 maps in the process of reproduction included 94 for engraving and 64 for multicolor photolithography; maps being edited or awaiting editing included 35 maps for engraving and 128 for multicolor photolithography; and 664 maps remained on hand for preparation for reprinting.

The Section of Inspection and Editing maintains in Clarendon, Va., a small unit to draft maps produced by the Atlantic Division. Part of this staff was employed for about 5,000 man-days in drafting special maps of foreign areas urgently needed for use in the war program.

MAP INFORMATION OFFICE

The Map Information Office continued its work as clearing agency for data pertaining to maps and aerial photographs of both Federal and commercial agencies. The office maintains extensive card-index and map files and is equipped to furnish data to Federal and State institutions and to the public.

FIELD SURVEYS

Topographic mapping was carried on in 34 States and Puerto Rico. Cooperative projects were conducted with 17 States and Puerto Rico and with the Tennessee Valley Authority. The survey of the islands of Puerto Rico and Vieques was completed.

The mapping of 61 15-minute quadrangles and 192 7½-minute quadrangles was completed, and mapping was in progress on 41 15-minute quadrangles and 49 7½-minute quadrangles at the end of the year. In

addition, work on 128 quadrangles was progressing in some one of the steps prior to actual mapping. Of the 253 quadrangles completed and 90 partly completed, 279 are within the strategic area designated by the War Department. For use in the investigation of strategic and critical minerals, including bauxite, lead, zinc, vanadium, magnesite, high-aluminum clay, coal, and iron ore, 10 special large-scale maps were completed and 4 are in progress. Two maps of special areas on a scale of 1:24,000 were completed for the investigation of coal for coking and transcontinental transportation. Two special areas were mapped for river-utilization purposes and one for flood control. The survey of the Olympic National Park in the State of Washington was continued.

A large amount of work each year consists of the remapping on a larger scale and in greater detail of areas that had previously been mapped and reported, which partly accounts for the small increase in the percentage of the United States covered. Of the total area of the United States, 47.4 percent has now been covered by adequate topographic maps produced by the Geological Survey.

Topographic mapping by the Geological Survey in the United States, Puerto Rico, and Hawaii, to June 30, 1944

State	Area mapped during fiscal year 1944 for publication on standard scales, contour intervals from 5 to 50 feet (square miles)				Total area mapped to June 30, 1944 (square miles)	Percent-age of total area of State mapped to June 30, 1944	Control, fiscal year 1944		
	Field scale		New survey	Resur-vey			Spirit levels (miles)	Transit traverse (miles)	Triangu-lation stations estab-lished
	1 to 24,000 or larger	1 to 48,000							
Alabama	19	202	42	269	25,884	50.2			
Arizona		491	203	288	33,398	29.3	346	95	56
Arkansas	5		5		24,614	46.3	162	77	
California	48	516	228	336	132,404	83.4	170		27
Colorado					58,156	55.8			
Connecticut	472			472	5,009	100.0			
Delaware					2,507	100.0			
Dist. of Columbia					69	100.0			
Florida	2,835		2,835		11,949	20.4			
Georgia	123			123	25,202	42.8			
Idaho		351	351		37,623	45.0			
Illinois		711	705	6	45,018	79.8	24		
Indiana	293		293		7,789	21.5	196	127	
Iowa					14,233	25.3			
Kansas		230		230	65,852	80.0		116	
Kentucky					27,559	68.2			
Louisiana		1,150	1,147	3	17,542	36.2	418	255	
Maine		231	213	18	25,977	78.2	196	59	
Maryland	58			58	10,577	100.0	51	30	
Massachusetts	1,129			1,129	8,257	100.0			
Michigan	312	186	229	169	16,550	28.4	75	29	
Minnesota					9,542	11.4			
Mississippi					8,997	18.9			
Missouri	67	2,773	1,592	1,248	61,527	88.3	17	44	
Montana	12	396	408		39,312	26.7	132		
Nebraska					28,225	36.5			
Nevada		219	219		43,762	39.6			
New Hampshire	124			124	9,304	100.0			18
New Jersey					7,836	100.0			
New Mexico					36,156	29.7	315	19	6
New York	709			709	49,576	100.0	129	76	
North Carolina					19,574	37.1			

¹ Planimetric maps, not included in total surveys, were compiled from aerial photographs with field examination—Michigan, 907; Wisconsin, 837 square miles.

² Mapped on scale 1:31,680.

Topographic mapping by the Geological Survey in the United States, Puerto Rico, and Hawaii, to June 30, 1944—Continued

State	Area mapped during fiscal year 1944 for publication on standard scales, contour intervals from 5 to 50 feet (square miles)				Total area mapped to June 30, 1944 (square miles)	Percent-age of total area of State mapped to June 30, 1944	Control, fiscal year 1944		
	Field scale		New survey	Resur-vey			Spirit levels (miles)	Transit traverse (miles)	Triangu-lation stations estab-lished
	1 to 24,000 or larger	1 to 48,000							
North Dakota		713	713		16,828	23.8	359	312	
Ohio					41,222	100.0			
Oklahoma					41,586	59.5			
Oregon		260	260		35,681	36.8	113		
Pennsylvania		1,415	621	794	42,923	94.7		78	
Rhode Island	1			1	1,214	100.0			
South Carolina					15,772	50.8			
South Dakota					20,750	26.9			
Tennessee	328			328	23,998	56.8			
Texas		50	50		92,532	34.6			
Utah					20,119	23.7			
Vermont	85	244	28	301	9,286	96.6			4
Virginia	5	703		708	38,097	93.3	297	321	
Washington		603	449	154	44,175	64.8	72		32
West Virginia		65		65	24,181	100.0			
Wisconsin	75	(1)	75		20,348	36.2	67	339	9
Wyoming	93	265	282	76	35,642	36.4	9	30	9
Total	6,793	11,704	10,948	7,609	1,433,884	47.4	3,148	2,007	161
Hawaii					6,435	100.0			
Puerto Rico	1,401		1,401		3,370	98.8			

¹ See footnote on p. 113.

² Contour interval in meters.

WATER RESOURCES BRANCH

Water is one of the Nation's basic assets. It is necessary for all life, for irrigation, navigation, sanitation, and production of power, for certain industrial processes, and for many of the comforts of civilized life. It is a menace to life and property in times of flood. Its deficiency during periods of drought is often calamitous. Water is a varying resource. In all places and times, it is limited in quantity by the amount of water that reaches the earth's surface in the form of rain and snow. The amount available determines the acreage that can be irrigated, the size of power plants, the capacity of industrial plants, and the growth of towns, cities, and communities. In many places the limit of supply available for man's purposes has now been reached; the needs are conflicting, and pressing questions arise relating to priority of rights, superiority of use, and equitable division. Under these conditions reliable information is essential to stability of development, soundness of financing, efficiency of operation, and equity of administration. Congress has authorized the Geological Survey to collect and publish essential facts about the quantity, character, availability, and best methods of utilizing the water resources of the Nation.

COOPERATION WITH STATES AND MUNICIPALITIES

The appropriation by Congress for studies of water during the fiscal year 1944 was \$1,437,700. Of that appropriation, \$1,065,000 was restricted for use in cooperation with States and municipalities, but the 182 cooperating agencies contributed considerably more than that amount, and sufficient additional Federal funds were supplied from the unrestricted part of the appropriation to meet the excess offerings. The amounts contributed by States and municipalities are summarized below:

State:	Contribution	State:	Contribution
Alabama-----	\$14,375	New Hampshire-----	\$9,095
Arizona-----	25,400	New Jersey-----	21,600
Arkansas-----	10,450	New Mexico-----	38,350
California-----	85,913	New York-----	33,549
Colorado-----	33,500	North Carolina-----	24,000
Connecticut-----	10,790	North Dakota-----	7,000
Delaware-----	1,700	Ohio-----	23,067
Florida-----	32,950	Oklahoma-----	20,530
Georgia-----	15,000	Oregon-----	27,040
Idaho-----	26,167	Pennsylvania-----	31,100
Illinois-----	15,113	Rhode Island-----	1,750
Indiana-----	26,178	South Carolina-----	9,700
Iowa-----	25,970	South Dakota-----	2,800
Kansas-----	35,030	Tennessee-----	13,400
Kentucky-----	19,896	Texas-----	66,872
Louisiana-----	31,600	Utah-----	23,167
Maine-----	7,500	Vermont-----	4,760
Maryland-----	17,073	Virginia-----	25,600
Massachusetts-----	15,750	Washington-----	42,980
Michigan-----	18,000	West Virginia-----	9,000
Minnesota-----	16,075	Wisconsin-----	8,263
Mississippi-----	15,000	Wyoming-----	16,575
Missouri-----	13,350	Hawaii-----	44,352
Montana-----	12,660		
Nebraska-----	27,050		
Nevada-----	3,850	Total-----	1,110,890

ACTIVITIES CARRIED ON FOR OTHER FEDERAL AGENCIES

Other Federal agencies provided nearly \$700,000 for water-resources investigations that could not be financed by appropriated funds of the Geological Survey or included in cooperative programs. These agencies are the Office of the Chief of Engineers, Mississippi River Commission, and Office of the Quartermaster General, War Department; Bureau of Yards and Docks, Navy Department; Tennessee Valley Authority; Flood Control Coordinating Committee, Department of Agriculture; Weather Bureau, Department of Commerce; Bureau of Reclamation, Fish and Wildlife Service, National Park Service, Office of Indian Affairs, Office of Land Utilization, and Bonneville

Power Administration, Department of the Interior; Department of State; Defense Plant Corporation; Federal Power Commission; Veterans' Administration; and Federal Works Agency.

WAR AND POST-WAR ACTIVITIES

Requests for special reports on water have continued in large numbers throughout the year. Most of these requests have related to war activities, but increasing numbers of them have related to post-war problems that are now being studied widely. During the year more than 5,000 reports have been made in response to specific requests, 2,263 in the first 6 months and 2,789 in the last 6 months. These are in addition to the regular published reports. They have related to every State and to the Territories of Alaska and Hawaii but particularly to the industrial regions of the East, South, and West.

To record the variations in water supply resulting from fluctuations in precipitation, a widely scattered field force is needed. About 100 field headquarters are maintained, in which the assignments are reasonably permanent and experienced men familiar with local problems related to water are available. Such decentralization also serves well the purpose of cooperation, as close contact is maintained between the Survey personnel and cooperating State and municipal officials, and records and reports are made available currently where urgently needed. During the emergency of war and now in preparing for peace the decentralization has been especially valuable, because men who are experts not only in water but also in local problems have been available in all parts of the country to conduct special field investigations and to furnish promptly and efficiently information not elsewhere obtainable.

The demand for special services related to water as it affects war activities and post-war plans has thrown a heavy burden on the experienced engineers, geologists, and chemists of the Survey at a time when the force has been depleted by enlistment and draft for the armed services and by the assignment of experts to water-supply battalions in the several theaters of war. The maintaining of a force adequate for the performance of work that is essential to both war and peace has been difficult; it has been accomplished only by adding carefully selected replacements to the nucleus of experts.

CONTINUING ACTIVITIES

The operations of the Water Resources Branch are conducted by five administrative divisions—surface water, ground water, quality of water, utilization of water, and power resources. Because of the wide variations in quantity and quality of water, continuity of records is essential both for the emergency problems of war and for the re-

curing problems of peace; it is necessary, therefore, that at least as much of the ordinary activities of the Survey as will suffice to maintain continuity of records shall be carried on, even when the major efforts relate to war problems.

Records of the stage, quantity, or availability of surface waters are collected at about 5,000 gaging stations distributed through every State and the Territory of Hawaii, the number of stations depending upon the funds made available by cooperation with States and municipalities and by transfer from other Federal agencies. The field records are analyzed and released to the cooperating agencies and to the public as promptly as practicable. They are the basis for constructing, operating, and administering municipal and industrial water supplies, irrigation systems, power plants, flood-control works, inland waterways, and similar activities. Cooperation in surface-water studies is effective with about 161 State and municipal agencies, the personnel operating from 63 field offices.

The studies of ground water relate to the waters that lie in the zone of saturation, from which wells and springs are supplied. They cover the source, occurrence, quantity, and head of these waters; their conservation and replenishment; their availability and adequacy for domestic, industrial, irrigation, and public supplies, and as watering places for livestock, and the methods of constructing and utilizing wells and of improving springs. The increasing use of water from wells is causing a great demand for intensive studies of the quantities of ground water that are perennially available. Investigations conducted from 34 field offices were in progress during the year in nearly every State. In 6 States and in Hawaii the work was done in cooperation with 61 State and municipal agencies. Periodic measurements of water levels or artesian pressure were made in about 7,000 observation wells. Investigations were made or are in progress in most of the critical areas of heavy pumping to determine whether shortages in ground-water supplies are being caused by war demands.

Chemical analyses of 2,563 samples of water were made in the water-resources laboratory in Washington and of 6,729 samples in laboratories in Safford, Ariz., Albuquerque, N. Mex., Raleigh, N. C., and Austin, Tex. Many of the samples were collected in connection with studies of water supplies for Army and Navy establishments and for munitions plants and housing developments. Cooperative studies of the chemical character of surface waters were initiated in Louisiana and North Carolina and were continued in Florida, Georgia, New Mexico, and Texas. Samples of water were analyzed for cooperative studies of ground-water conditions in other States. Interpretations of analyses or advice about water problems were furnished to 16 Bureaus in 6 Federal Departments and to 8 independent agencies.

A variety of hydrologic and hydraulic studies and compilations are made on the utilization and control of streams, and a monthly summary, the Water Resources Review, is issued giving stream-flow and ground-water conditions throughout this country and Canada. These summaries are used extensively by many agencies, including major war agencies, engaged in production where floods or droughts are vital. The administration of certain responsibilities relating to permits and licenses of the Federal Power Commission has been continued. Because of the importance of power in the war program this function is increasingly essential. Investigations of water problems along the international boundary between the United States and Canada have been continued for the State Department and the International Joint Commission. Several studies were made that have an important bearing on water investigations and projects to be undertaken after the war.

CONSERVATION BRANCH

The Conservation Branch has two principal functions: (1) Making surveys of the water and mineral resources of the public domain and applying the results to the problems of public-land administration; (2) supervising operations incident to the development of power and to the production of minerals, including oil, gas, coal, potash, sodium, lead, and zinc from public lands, Indian lands, and naval petroleum reserves.

Additional funds made available during the year provided extra assistance and equipment necessary for the undertaking of field investigations and engineering studies and the preparation of reports dealing with power, fuels, minerals, and chemicals essential to the national war program. The results of this activity, if maintained on the present scale, will reveal the presence of new reserves and will provide information essential to the improvement of production practices and the elimination of waste, thereby increasing available reserves and furnishing the basis for sound post-war planning and true conservation of energy resources.

CLASSIFICATION OF LANDS

Mineral classification.—The Mineral Classification Division, in response to war-engendered demand for new sources of oil, gas, coal, potassium, and magnesium from the public domain, continued and increased markedly all phases of its service of furnishing to the agencies of the Interior Department concerned with public-land administration the geologic findings and decisions required by law or policy.

In all, 10,887 cases, each involving one to many geologic determinations, were acted on during the year, an increase of 38 percent over 1943. In addition, initial or revised definitions of the known geologic structure of four producing oil or gas fields were prepared and promulgated, increasing the net area so defined in 9 public-land States to 1,710,931 acres on June 30, 1944; geologic appraisal was made of 60 unit-plan submissions; and 34 special reports were rendered to the General Land Office on new discoveries of oil or gas on or adjacent to Federal lands.

To facilitate the acquisition of the basic geologic data required for the discharge of its increasing duties in connection with public-land classification and leasing-law administration, the Division established during the year regional field offices with a resident geologist in charge of each at Los Angeles, Calif., and Great Falls, Mont., and opened suboffices of its Denver regional office at Casper, Wyo., and Salt Lake City, Utah. From these offices numerous field investigations were carried on during the year in Colorado, Wyoming, Montana, California, and Utah.

Water and power classification.—All new surveys and investigations concerning the water-power resources and storage possibilities of Federal lands were on projects proposed for development to assist in the prosecution of the war or for post-war construction. Topographic surveys were made of 142 linear miles of stream valley and of 1 mineral leasehold, and, in cooperation with the Water Resources Branch, supervision of construction and operation was given to 167 power projects under license from the Federal Power Commission, to 193 such projects under permit and grant from the Department of the Interior, and to 154 in cooperation with the Office of Indian Affairs.

Office studies resulted in the addition of 67,166 acres to power-site reserves and the elimination of 30,650 acres therefrom, with net increase of the outstanding reserves of 23 States and Alaska to 6,671,948 acres; in the publication of maps of 580 miles of river valley and 8 dam sites; in final action involving hydraulic determination on 261 cases received for report from departmental sources and the Federal Power Commission; and in water-power classification on 1,726 cases, which also involved mineral classification. Reservoir-site reserves in 9 States remain unchanged at 137,172 acres.

MINERAL LEASE SUPERVISION

Mine supervision.—The Mining Division supervises operations for the discovery and production of coal, potassium, sodium, phosphate, and oil shale on public lands; of all minerals, except oil and gas, on tribal and restricted allotted Indian lands; and of other minerals on various land grants. The Division serves as consultant to the De-

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partment of Agriculture on mining leases under the jurisdiction of that Department and also supervises production of minerals from public lands by the Metals Reserve Co. and the Defense Plant Corporation under authorization of the Secretary of the Interior. The supervisory work, directed from 6 field offices in the western United States and 1 in Alaska, included on June 30, 1944, 636 public-land properties under lease, permit, or license in 15 States and Alaska; 225 Indian properties under lease or permit in 14 States; and 4 secretarial authorizations in 3 States. The total output was valued at more than \$62,000,000.

The Division cooperated with the Departments of War, Justice, and Agriculture, other bureaus of the Department of the Interior, the War Production Board, the Reconstruction Finance Corporation, the Defense Plant Corporation, and the Office of Price Administration by furnishing information on potential sources of minerals necessary to the war program.

The war-induced expansion of mining operations has resulted in an accelerated diminution of the known potash reserves in New Mexico. Under instructions from the Secretary of the Interior the Geological Survey and the Bureau of Mines are cooperatively drilling test holes under contract and have proved additional high-grade potash reserves of national importance in and adjacent to the potash reserve created by Executive Order 6797.

The production of zinc from leased Indian land in Oklahoma has been maintained only by working ores of successively lower grade under the stimulus of production premiums. The Division is now making studies to aid in increasing production by improvements in recovery practices and is obtaining information on the probable reserves of low-grade ore that may be mined by large-scale mechanized operations.

Oil and gas supervision.—The Oil and Gas Leasing Division supervises operations for the discovery and production of petroleum, natural gas, natural gasoline, and butane occurring in public lands of the United States, in naval petroleum reserves, and in all Indian lands subject to departmental jurisdiction, both tribal and allotted, except those of the Osage Nation, in Oklahoma. During the fiscal year 1944 these duties were accomplished through 18 field offices and suboffices in California, Colorado, Montana, New Mexico, Oklahoma, Utah, and Wyoming.

To meet wartime demands, the Division opened new suboffices at Bakersfield, Calif., and Artesia, N. Mex., and, by intensive recruitment, succeeded in building up four special-study groups to aid in the adoption of proper secondary-recovery methods and other engineering practices necessary to conservation and maximum ultimate recovery of petroleum. During the year studies were completed and preliminary

reports prepared on the Hogshooter Field, Okla., the Cole Creek Field, Wyo., the Grayburg Unit Area, N. Mex., and the Buena Vista Front Pool, Calif.

On public lands 5,329 properties were under supervision at the end of the fiscal year, aggregating 3,106,392 acres in 20 States and Alaska.

Drilling on public lands during the year included the spudding of 536 wells and the completion of 506 wells, 350 of which were productive of oil and gas and 156 of which were barren. In all, 11,096 public-land wells, including 5,893 capable of oil and gas production, were under supervision on June 30, 1944. The production of natural gas and gasoline from public lands during 1944 was somewhat less than in 1943, and the production of crude oil was somewhat more.

The efforts to fulfill the need for new petroleum reserves were reflected in an increase of 8 in the number of new unit plans approved during the year, the total being 18; 29 unit plans were terminated because all rights thereunder were relinquished or abandoned, leaving 112 approved plans covering 1,342,149 acres outstanding on June 30, 1944. Production under approved unit agreements constituted about 59 percent of the petroleum obtained from public lands during the year, 69 percent of the natural gas, and 84 percent of the gasoline and butane.

On Indian lands the work of oil and gas lease supervision involved 4,572 leaseholds in 9 States, containing at the end of the year a total of 7,499 wells, 4,012 of which were productive of oil or gas and 201 of which had been completed during the year. Notable increases in production of natural gas and crude oil were reported from the Chickasaw and Choctaw lands in Oklahoma, from the Blackfeet lands in Montana, and from the Shoshone lands in Wyoming. Rentals, royalties, and bonuses accrued from Indian-land operations during the fiscal year are estimated to aggregate \$3,292,305.

On behalf of the Navy Department supervision was continued over operations for the production of oil, gas, gasoline, and butane from 21 properties under lease in Naval Petroleum Reserve No. 2 in California. Production from 259 active wells on this reserve aggregated 1,569,004 barrels of petroleum, 1,373,863,000 cubic feet of natural gas, and 7,494,253 gallons of natural gasoline and butane, having an aggregate royalty value of \$252,629.

WORK ON PUBLICATIONS

Texts.—The publications in the regular series (professional papers, bulletins, and water-supply papers) issued during the year numbered 49, as contrasted with 76 in the preceding year. This substantial reduction reflects adjustment to a war-curtailed publication schedule, with postponement of more general scientific reports and a concentration on the issue of those that would be of greatest direct or indirect

aid to the war program. In addition, 14 miscellaneous pamphlets were published. Work by the editors included the following: 6,686 pages of manuscript edited and prepared for printing; 223 galley proofs and 3,698 page proofs revised and returned; indexes prepared for 17 publications, covering 1,193 pages and consisting of 1,650 index entries. Copy prepared for mimeographing included 127 press releases, comprising 145 pages, and 257 pages of miscellaneous material.

Illustrations.—Twenty-eight reports, containing 475 illustrations, were transmitted to the printer. In addition, 157 maps and sections illustrating deposits of essential strategic minerals were prepared for preliminary release, and 153 proofs and 67 edition prints were examined.

Geologic map editing.—The work of the Section of Geologic Map Editing was varied in type, ranging from simple line drawing and retouching to extremely difficult drawings of complex maps and sections. In all, 119 maps and other illustrations were prepared. Most of these were concerned with investigations directly related to the war minerals program. A large part of the time of 1 illustrator since March has been spent in the preparation of an index map of the geology of the United States. In addition, maps and other illustrations for 5 water-supply papers and 85 maps for bulletins on strategic minerals and 1 professional paper were edited and reviewed during the various stages of their final preparation.

Distribution.—The Division of Distribution received during the year a total of 804 publications, comprising 63 new books and pamphlets and 2 reprinted books, 293 new or revised topographic and other maps, of which 3 maps were first published as "preliminary" editions, 12 Tennessee Valley Authority maps with contours, 421 reprinted topographic and other maps, 3 new advance sheets, and 10 reprinted advance sheets. The total units of all publications received numbered 88,596 books and pamphlets, 5,000 copies of the revised Missouri index map, and 2,363,815 topographic and other maps, a grand total of 2,457,411. The division distributed, or otherwise disposed of, 287,148 books and pamphlets, 624 geologic folios, and 1,462,298 maps, a grand total of 1,750,070, of which 510 folios and 1,232,123 maps were sold. The net proceeds (gross collections less copying fees and amounts refunded) from the sales of publications were \$31,209.15, including \$31,078.50 for topographic and geologic maps, and \$130.65 for geologic folios. In addition to this \$48,942.53 was repaid by other establishments of the Federal Government at whose request maps or folios were furnished. The total net receipts, therefore, were \$80,151.68.

Engraving and printing.—During the year 84 newly engraved topographic maps, 177 multicolor topographic maps (2 of which were originally printed as advance maps), and 26 special maps were printed, making a total of 287 new maps printed and delivered. Reprint edi-

tions of 403 engraved topographic maps and 22 photolithographed State and other maps were printed and delivered. Of new and re-printed maps, 712 different editions, amounting to 2,359,625 copies, were delivered. A large amount of work was done for 53 other units of the Government, including branches of the Geological Survey, and the charges for it amounted to about \$204,000, for which the appropriation for engraving and printing geologic and topographic maps was reimbursed. Transfer impressions and velox prints, numbering 145, were made during the year, and the amount turned over to miscellaneous receipts was \$263.20. Topographic maps and contract and miscellaneous work of all kinds, totaling 3,096,999 copies were printed and delivered. The photographic laboratory made 12,847 negatives, 27,129 prints, 3,310 photolith press plates, 167 intaglio etchings, 3 celluloid transfers, and mounted 810 prints.

LIBRARY

Work for the Military Geology unit of the Survey constituted a major service of the library. The War and Navy Departments, the War Production Board, the Foreign Economic Administration, and other war agencies made increased use of the library's facilities. The total number of readers was 13,163; of these 3,402 were from other agencies. The total circulation of books, pamphlets, periodicals, and maps was 72,853. Acquisitions were slightly greater than in 1943, but still much below the normal pre-war number. The present war work required a somewhat broader field of material, and this is reflected in the type of books and journals purchased. The Bibliography of North American geology, 1929-39—the 11-year cumulative volume, which includes the otherwise unpublished bibliography for 1937-39—was received from the printer in May. It contains 1,546 pages and more than 28,000 entries. The somewhat new format, which makes it much more useful, has been greatly complimented.

FIELD EQUIPMENT

Outstanding improvements in the trimetrogon mapping procedures are resulting from the construction of three stereoblique plotters by the Division of Field Equipment for the Alaskan Branch during the past year. Numerous operations that had been necessary previously in the production of trimetrogon reconnaissance maps will henceforth be reduced or eliminated, and greater speed, accuracy, and lower costs will result from their use. Parts for seven additional models have been fabricated, and these are expected to be completed and placed in operation during the month of July. Activities during the past year have been marked by the unusual number of "dead lines" that had to be met. One such deadline was the result of a sudden decision to re-design and construct for greater portability an ortho-

graphic projection machine to be taken by military geologists into the theaters of war. This machine is used for producing three-dimensional relief diagrams from topographic maps. It was necessary to complete work on it in approximately one-third of the time needed to produce the original model. Another article that was constructed with very limited time allowance was a graph-rectifying device, by which a discontinuous graph on curvilinear coordinates could be mechanically and accurately translated into a continuous graph with rectilinear coordinates. The device provided an infinite selection of changes in scale, both laterally and longitudinally, to any size within approximately 50 to 150 percent of the scales of the original graphs. Other instruments unusual in type and design that were constructed in the Division of Field Equipment are six Hotchkiss superdips, such as are used by geologists in measuring the comparative magnitude of variations in the earth's magnetic field, and a device which produces true perspective drawings of land areas from topographic maps.

FUNDS

During the fiscal year 1944 there was available for expenditure under the direction of the Geological Survey a total of \$11,585,328. Of this amount \$5,576,495 was appropriated directly to the Geological Survey, and \$6,008,833 was made available by other Federal agencies, and by States and their political subdivisions. In addition, \$9,700 was allotted from the appropriation for contingent expenses of the Department of the Interior for miscellaneous supplies.

Funds available to the Geological Survey in 1944 from all sources

General administrative salaries:

Interior Department Appropriation Act.....	\$189, 670	
First Deficiency Appropriation Act.....	31, 200	
		<hr/> \$220, 870

Topographic surveys:

Interior Department Appropriation Act.....	672, 500	
States, counties, and municipalities.....	313, 624	
War Department.....	1, 739, 448	
Tennessee Valley Authority.....	76, 000	
Public Roads Administration.....	42, 169	
Miscellaneous repay.....	95, 807	
		<hr/> 2, 939, 548

Geologic surveys:

Interior Department Appropriation Act.....	1, 176, 500	
First Deficiency Appropriation Act.....	106, 000	
States, counties, and municipalities.....	22, 322	
Bureau of Mines.....	317, 000	
Board of Foreign Economic Administration.....	64, 000	
War Department.....	166, 400	
Miscellaneous repay.....	355	
		<hr/> 1, 852, 577

Funds available to the Geological Survey in VTDD from all sources—Continued

Strategic and critical minerals:

Interior Department Appropriation Act.....	\$624, 000	
First Deficiency Appropriation Act.....	68, 000	
States, counties, and municipalities.....	4, 562	
State Department (for work in other American Re- publics).....	74, 172	
Miscellaneous repay.....	388	
		\$771, 122

Mineral Resources of Alaska:

Interior Department Appropriation Act.....	157, 500	
First Deficiency Appropriation Act.....	20, 000	
War Department.....	711, 952	
		889, 452

Gaging streams:

Interior Department Appropriation Act.....	1, 312, 900	
First Supplemental National Defense Appropriation Act.....	90, 000	
First Deficiency Act.....	33, 700	
States, counties, and municipalities.....	1, 152, 193	
Permittees and licensees of Federal Power Com- mission.....	27, 366	
Department of the Interior:		
Bonneville Power Administration.....	50	
Fish and Wildlife Service.....	2, 165	
Office of Indian Affairs.....	6, 581	
Office of Land Utilization.....	16, 400	
National Park Service.....	338	
Bureau of Reclamation.....	6, 933	
Department of Agriculture.....	775	
Commerce Department.....	133	
Federal Power Commission.....	153	
Defense Plant Corporation.....	57, 922	
Federal Works Agency.....	9, 618	
Navy Department.....	3, 631	
State Department.....	50, 000	
Rubber Reserve Corporation.....	117	
Tennessee Valley Authority.....	59, 500	
Veterans' Administration.....	100	
War Department:		
Office of Chief of Engineers.....	709, 215	
Mississippi River Commission.....	2, 717	
		3, 542, 507

Classification of lands:

Interior Department Appropriation Act.....	225, 000	
States, counties, and municipalities.....	1, 500	
War Department.....	4	
		226, 504

Printing and binding, Interior Department Appropriation

Act.....	87, 500
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Funds available to the Geological Survey in 1944 from all sources—Continued

Preparation of illustrations:		
Interior Department Appropriation Act.....	\$22, 925	
First Deficiency Appropriation Act.....	3, 100	
		\$26, 025
Engraving and printing geologic and topographic maps:		
Interior Department Appropriation Act.....	200, 000	
First Deficiency Appropriation Act.....	32, 000	
Miscellaneous repay.....	165, 417	
		397, 417
Mineral leasing:		
Interior Department Appropriation Act.....	475, 000	
First Deficiency Appropriation Act.....	49, 000	
Navy Department.....	20, 000	
Office of Indian Affairs.....	85, 000	
Department of Agriculture.....	674	
Department of Justice.....	158	
		629, 832
Payment from proceeds of sale of water, special account.....		1, 974
Total.....		11, 585, 328

Solid Fuels Administration for War

C. J. POTTER, Deputy Administrator



IRREPARABLE harm to the fighting of the war, because of inadequate coal production, was averted during the fiscal year by forthright measures taken by the Solid Fuels Administration for War in cooperation with the coal industry, the mine workers and consumers.

In this period, the Nation's fuel requirements soared to new heights, creating record-breaking demands for bituminous coal, anthracite, and coke.

Lack of manpower and other handicaps, including mine strikes, prevented the coal mining industry from increasing production sufficiently to meet the full requirements of war industries and domestic users and necessitated adoption of a coordinated program to distribute current production to those who needed it most.

Every possible measure was taken to increase production and to distribute mine output so as to avoid distress to domestic consumers and impairment of industrial activity. Early in the period, it was necessary to issue thousands of directions diverting coal shipments to industrial consumers and retail yards in dire need of fuel. Later in the year measures became necessary for general control over distribution of the scarce types of solid fuels.

The Solid Fuels Administration was established 2 months before the start of the fiscal year, succeeding the Office of Solid Fuels Coordinator for War. Within a few days after it was set up, the agency was faced by the coal supply threat which resulted from the first of a series of general mine strikes. These were caused by a breakdown in wage contract negotiations between mine operators and labor. Until the Administration could recruit the trained staff it needed, its skeleton organization was forced to handle the strikes and problems of coal supply chiefly with personnel loaned by other agencies.

Its initial task was that of administering coal mines taken over by the Secretary of the Interior on order of the President but it was relieved of this duty with the establishment of the Coal Mines Administration shortly after the start of this fiscal year. During the period it was administering Government possession, and afterward in cooperation with the Coal Mines Administration to which it was subordinated, it concentrated on the job of increasing mine output.

It worked with the War Manpower Commission and the Selective Service System to retain as much manpower as possible for the mines; with the Office of Price Administration to make sure that coal prices were such as to stimulate the maximum production and distribution; with mine operators, unions, and the Coal Mines Administration to make sure that working conditions in the mines were safe for the miners; with the Office of Defense Transportation to make sure that the supply of coal cars was adequate and that coal was moved expeditiously to the places where it was needed. It cooperated with the operators and the War Production Board to provide essential new and replacement machinery for the mines and with the industry in developing production incentive campaigns. It promoted maximum stocking of coal to keep mines in full operation during the war months. These efforts assisted in stimulating the production of an all-time record volume of bituminous coal and a wartime peak of anthracite output.

Loss of potential coal production during 1943 and 1944 as the result of strikes and discontent among miners cost an estimated 40 million tons of anthracite and bituminous coal. Added to this was a drain on skilled mine manpower into other industries and into the armed services, thereby constantly reducing mine productive capacity. The problem appeared likely to continue throughout the war since replacements are not available.

Upon the men who remained in the mines—and their average age increased from about 32 years to about 45 years—fell the task of stepping up mine output. While these older men did a remarkable job of increasing the per-man production of the mines, they were unable to mine sufficient coal to fill requirements.

As a result, the Nation's needs had to be met in part by utilizing the reserves of bituminous coal above ground in consumers' stockpiles which had been built against such an emergency under the stimulus of the Administration's predecessor, the Office of Solid Fuels Coordinator for War.

From the 86 million tons of bituminous coal in these stockpiles at the start of 1943, a total of some 30 million tons was withdrawn to meet current needs during the calendar year, and an additional 6 million tons was withdrawn in 1944 before consumption fell below production and permitted the addition of fresh reserves to the depleted stockpiles.

The interruptions to production and the fact that the reserves were unequally spread about the country made the problem of distribution

the available coal supply extremely complicated. Coal distribution, even in peacetime, is a complex job. Grades, types, and sizes of coal vary widely, and consumers' burning equipment likewise varies. Some consumers cannot operate without certain coals; other consumers, because of long use and tradition, are accustomed to particular coals. With the shortages of manpower affecting mines unequally, radical shifts had to be made in the distribution of the output of mines throughout the country to make sure that consumers requiring special coals were able to get them and that consumers got enough of some kind, grade or size of coal for essential needs.

This was a task of enormous magnitude. It meant taking into account the production of about 15,000 mines controlled by 14,000 producers; it meant utilizing efficiently the distributing facilities of 1,500 wholesalers and of tens of thousands of retail dealers; it meant considering the needs of millions of domestic and industrial consumers.

Before the coordinated program necessary properly to balance all the factors entering into this complex situation could be fully developed and effectuated, one local crisis after another had to be surmounted. While much of the Solid Fuels Administration's effort had to be devoted to handling immediate and specific problems, nevertheless, prior to the close of 1943, it was possible to inaugurate broader-gage plans and by the spring of 1944 the entire distribution program had been put on a long-range basis.

THE IMMEDIATE PROBLEMS

The first serious coal shortage occurred in the byproduct coke industry, which supplies the steel industry, as a result of decreased output in mines normally serving it, coupled with increased requirements. This was met by emergency directions which diverted coal suitable for byproduct purposes from other industries to the byproduct plants. The second immediate problem was to halt a maldistribution of anthracite among domestic consumers resulting from changes in the pattern of requirements and from deficiencies in the productivity of various mines. The third problem was to increase the flow of coal via the Great Lakes to move a year's supply to upper lake docks before the seasonal close of navigation. The fourth problem was to supply coal to industries with insufficient stockpiles.

After the start of the heating season and throughout the winter months there was superimposed upon these principal problems a whole series of domestic coal shortages throughout the eastern half of the country. Community after community ran short of coal and required emergency assistance. Bituminous coal normally used by industry was rushed into Northeastern States to supplement inadequate supplies of domestic-sized anthracite. Similarly, bituminous coal was diverted into Southeastern States and into Michigan for domestic purposes.

Throughout the Plains States voluntary emergency shipments of coal were moved into hundreds of communities. Part of this domestic crisis was due to a shortage of coal to meet unexpectedly increased requirements which came from a decline in the firewood supply, from conversions to coal by users of oil and gas and from war-created population shifts.

These sweeping problems compelled the Solid Fuels Administration to increase its small initial staff rapidly by drafting trained coal men from other Government bureaus and from the industry.

LONG-RANGE PROGRAMS

Handling of the earlier problems was largely by specific directions to producers to ship coal to consumers who were short. These actions prevented interruptions of the war-production program and general suffering among domestic consumers of coal. As the volume of these directions became unmanageable, it became necessary to issue broad orders to direct the whole flow of coal and thereby eliminate many specific directions.

As rapidly as conditions permitted, the Solid Fuels Administration began to make plans for coal distribution in the months ahead. The first long-range plans covered the winter of 1943-44 and a second series of plans covered the entire coal year of 1944-45. By April 1, 1944, general regulations had been issued laying down a distribution program to continue in effect until March 31, 1945. This program, covering the whole distribution of solid fuels, is designed to spread the supplies expected to be available as fairly as possible. Cut-backs in the domestic consumption of the scarcer solid fuels are provided to assure that most domestic consumers may receive up to nine-tenths of their normal requirements of coal.

To draw up these programs it was necessary to collect a large volume of production and distribution statistics. A steady flow of this information to the Solid Fuels Administration was thereafter required. Upon the basis of these reports it was possible to keep reasonably informed on over-all coal supply and distribution and to determine changes necessary in the pattern of coal distribution.

To assemble this information, full use was made of the statistical services of the former Bituminous Coal Division and of the Bureau of Mines. But with the termination of the Bituminous Coal Division in August 1943 a large share of this statistical work fell upon the Solid Fuels Administration itself. Before the end of the fiscal year, all this work was turned over to the Bureau of Mines in the interest of the most efficient coordination.

In developing its new programs, the Solid Fuels Administration relied in large measure on the experience and advice of the coal industry. A series of industry committees provided continued close contact of the agency with producers, transporters and distributors of coal.

The primary committee is the Solid Fuels Advisory War Council, first set up early in 1942 by the Solid Fuels Coordinator for War. Its counsel has been secured on every important program undertaken by the Solid Fuels Administration. Contacts with soft coal producers are maintained through advisory boards for the 22 bituminous coal mining districts.

Advisory committees have been established by the Solid Fuels Administration to cover the supply and distribution of anthracite, of bituminous coal and of coke for domestic use. To maintain contact with the thousands of retail dealers, a National Retail Distribution Committee meets regularly to make recommendations.

Dealers throughout the country have been organized into committees to function as an emergency distribution system prepared to avert the development of acute shortages by keeping the Solid Fuels Administration currently informed on area supply conditions. The same committees will function, when necessary, to pool dealer and community resources and take other steps to meet unavoidable emergencies. This flexible system is adaptable to varied local conditions.

ANTHRACITE DISTRIBUTION

Anthracite, the primary fuel for household and other domestic uses in New England and the Middle Atlantic States, provided the Solid Fuels Administration with the most difficult retail distribution problems met in 1943-44. Responsible for this were the sharply increased demands for domestic sizes due to the influx of war workers into eastern cities, to heavy seaboard conversions from fuel oil, gas and fuel wood, to the withdrawal of much coke from the domestic market, to heavy consumption in the winter of 1942-43 which had exhausted normal dealer inventories and to large new requirements for the military services.

Partly due to these changes in demand and partly to changes in the productivity of various mining operations, a serious maldistribution of the available hard coal was far advanced before the Solid Fuels Administration could halt it. Some retail dealers had received large supplies of anthracite and had oversupplied their customers and others had received little or no coal and their customers were undersupplied.

An emergency program to halt this maldistribution was instituted by the Solid Fuels Administration shortly after mid-June 1943. This program was enlarged on September 1 by ordering a redistribution of current production among wholesalers as a means of bringing retail dealer receipts nearer a common level and by cutting back 10 percent under the 1942-43 receipts the quantities individual dealers could receive. At the same time, the Office of Price Administration was given authority to limit the distribution of hard coal from retailer

to consumer. In November 1943, the Office of Price Administration relinquished this control and the Solid Fuels Administration itself instituted a dealer-consumer limitation program.

While these measures improved the situation, the earlier maldistribution could not be fully corrected and, as the winter progressed, hundreds of householders in community after community ran out of coal simultaneously. Emergency diversions totaling some 300,000 tons of coal were required during the winter months to relieve distress. Moreover more than 825,000 tons of hard coal were ordered transferred from one wholesaler to another to level the coal year distribution. To supplement inadequate anthracite supplies, coal from Northern and Southern Appalachian bituminous mines was diverted into seaboard communities. Emergency organizations of several types helped to distribute the limited supplies of solid fuels to householders who ran short in many of these communities.

The supply of anthracite available for domestic distribution in the 1944-45 coal year is running more than 6,000,000 tons short of estimated requirements. A similar shortage existed in the 1943-44 coal year.

A new control program, developed from the 1943-44 coal year experience and designed to spread equitably the limited production, was instituted on April 1, 1944, for the 1944-45 coal year. This limits domestic consumers to seven-eighths of their normal supply and provides better controls over distribution from the mines to assure that the output is distributed fairly among dealers.

Increased output of fine sizes of anthracite, suitable only for industrial use, threatened for a time in the fiscal year to clog up the anthracite car supply by the inability of producers to market the coal. However, the Solid Fuels Administration undertook a program to find additional uses for these fine sizes and the situation had been helped before the year's end.

BITUMINOUS COAL DISTRIBUTION

Approximately 90 percent of the Nation's coal output is bituminous coal which varies widely in type and quality depending on the mine and the area from which it comes. Since it is the chief industrial fuel, as well as the domestic fuel for millions of consumers, supply deficiencies could interfere seriously with the whole war program.

Shortages in the supply of high grade eastern-mined coals, which are required for coke making in the expanding steel industry and for the production of metals and certain strategic chemicals, created difficulties early in the fiscal year. As time went on, these shortages extended into the domestic supply which, in large areas, was threatened. Consumers, both industrial and domestic, who were unable to secure the eastern coals then turned to midwestern coals and these new and

heavy demands extended the shortages into those fields. Consumption requirements exceeding the output were met by diversions from industrial users who had stockpile protection.

Diversions of current production were accomplished, first, by specific directions which ordered coal shipped to a consumer who was short, and, second, by the institution of regulations which restricted the amount of coal industries were permitted to procure currently in accordance with the protection represented by their stockpiles. The first method, which continued to be necessary in some instances even after general regulations were instituted, necessitated learning from whom the coal would be taken and making sure that it was the type which was suitable for the consumer to whom it was directed. Under the second method of general regulation, industries with ample stockpile protection were compelled to reduce current purchases proportionately, and industrial users with little or no coal on hand were permitted to buy beyond current requirements to build up their protection.

The volume of specific directions issued at times during the fiscal year laid a heavy burden upon the staff of the Solid Fuels Administration. In all a total of 6,541 directions for the shipment of bituminous coal were sent out covering a total of 10,417,496 tons.

Because production of many captive mines which supplied coal to the byproduct coke industry had declined seriously, the problem of supplying the proper coal for coke manufacture was one of the first handled by the office. To reduce the flow of directions diverting coal suitable for byproduct and special purposes away from industrial consumers who had been using it for steam generation, producers were required eventually to give a first preference, before filling any other orders, to the needs of the byproduct industry and to users of special purpose coals.

Late opening of the 1943 navigation season on the Great Lakes and the mine strikes which interfered with the normal movement of coal to the lakes had held the movement up the lakes before midsummer to a dangerously low point. To force additional coal up the lakes, producers were directed to fill orders for coal to be moved by lake, second only to the top preference given to byproduct and special purpose coal. Extremely heavy shipments followed during the last few months of the navigation season, with the result that by the end of 1943 the total movement from Lake Erie ports was within 2,000,000 tons of the 1942 shipments. The preference for lake-borne coal was continued in the 1944-45 program with the additional requirement that shipments be made on an equal monthly basis throughout the navigation season, thereby eliminating need for heavy late season movements.

Although the Pacific Northwest had been expected to provide serious problems in the winter of 1943-44 and the Solid Fuels Administration took steps to prepare for them, a combination of circumstances

favorable to the area carried it through the winter without special trouble. Production of coal mines in the Pacific Northwest grew better, the volume of coal imported from Canada was increased and, unexpectedly, a large flow of coal was available from mines in Colorado and Utah. This coal normally would have been moved to the Plains States, but a blocked railroad tunnel necessitated its movement elsewhere.

Although the winter was mild in the Northwest, in the Southeast it was 15 percent colder than normal. The Southeastern States are dependent normally on the same Southern Appalachian mines which supply the Great Lakes trade. Insufficient production in the mines coupled with the heavy movements to the lakes decreased the coal available for the Southeast.

To correct this situation between January and March 1944, producers normally supplying the Southeast were required to fill all outstanding retail orders from that area on their books. Approximately 400,000 tons of coal were moved into Southeastern States in two weeks and the situation was relieved.

The heavy requirements for Southern Appalachian coal for by-product purposes and for the Great Lakes movement likewise brought repercussions in other areas, such as Michigan, where domestic consumers ran short of the coal they normally received all-rail from the mines. Shipments direct from mines either by voluntary arrangement with the producers or by specific direction assisted in relieving these shortages. Communities in Western Kentucky, Western Tennessee and other East South Central areas normally receiving high volatile coals from midwestern mines also suffered periods of shortage due to the heavy demand for those coals. Emergency shipments from the mines relieved the deficiencies.

The supply of bituminous coal for the Nation's railroads, which ordinarily consume 23 percent of the bituminous coal output, ran perilously low several times during the winter. Emergency action was required to keep some of the biggest lines in full operation. After consultation with the railroad industry, arrangements were made to substitute available coal for some of the high grade eastern coal the railroads ordinarily used. This has resulted in a largely increased use by railroads, even in the East, of middle western and strip-mined coal. Railroads normally supplied with eastern coal from the Great Lakes docks are now taking midwestern coal moved by way of Lake Michigan.

With the end of the heating season in the spring of 1944, the Solid Fuels Administration controls over the distribution of bituminous coals were relaxed as far as practicable to encourage industrial consumers to rebuild their depleted stockpiles as rapidly as coal became available, thereby fully utilizing mine capacity. The modifications

were first applied to midwestern coals and then were extended to various eastern coals as the heavy demands for those coals declined. No modifications, however, were made in the controls over Southern Appalachian-mined coal which remained in short supply.

Since it was evident that the available tonnage of domestic sizes of Southern Appalachian coals would continue below requirements, a new Governmental control was put into effect on April 1, 1944, limiting the amount of such fuels dealers could furnish to domestic consumers during the warm months for storage purposes. Under this regulation, which was of temporary character, an equitable distribution of the limited supply expected to be available during the spring and summer months was instituted. A program to supplant this temporary action and to control the distribution of scarce bituminous coals throughout the 1944-45 coal year was being formulated at the end of the fiscal year.

DOMESTIC COKE DISTRIBUTION

The responsibility for the equitable distribution of domestic coke was delegated by the War Production Board to the Solid Fuels Administration on December 31, 1943. Temporary regulations were instituted for the remainder of the winter providing that coke be supplied only to consumers with limited stocks. In the 1944-45 coal year program the distribution of domestic coke was coordinated with that of other domestic solid fuels. In the New England and Middle Atlantic States coke is controlled under the regulations which govern anthracite. In the remainder of the country it is controlled under the regulations which govern the distribution of scarce bituminous coal.

To increase the supply of fuel available for the Northeastern and Middle Atlantic States, producers were persuaded to reclaim usable beehive coke which had accumulated in refuse piles near the ovens. This coke has helped materially in supplementing the supply of fuel available to domestic consumers, but the supply is running short and is expected to become exhausted within the next few months.

Because some of the reclaimed coke was being marketed without proper preparation, the Solid Fuels Administration established a maximum permissible limit for ash content to insure that unsatisfactory fuel was kept off the market.

COAL PRODUCTION

Definite contributions to the coal industry's remarkable production record in 1943 and in the first half of 1944 were made by the Government's coal agencies, the Solid Fuels Administration for War and the Coal Mines Administration. Output in 1943 was estimated at 589,000,000 tons of bituminous, an increase of some 6,000,000 tons over

1942 and the highest production on record, and at 60,644,000 tons of anthracite, highest since 1930. This was accomplished in spite of the continuous attrition of mine manpower and the losses of potential production during the strikes.

The two Government agencies helped to bring harmony between management and labor, helped to make 6-day operation general throughout the industry and secure cooperation of the industry in reducing production losses at holiday and vacation times. The Coal Mines Administration, through the Government-labor agreement, lengthened the working day. The Solid Fuels Administration for War took every available step to maintain mine manpower, to provide essential machinery and equipment and to assist in the extension and development of the mines.

Much of the increased production has been in the low grade and strip-mined bituminous coals and in the fine sizes of anthracite, all of which are suitable only for some industrial purposes. Production of the eastern-mined bituminous coals, essential to the byproduct and metallurgical industries and for domestic use, and of domestic sizes of anthracite continue far short of requirements. Careful control of the distribution of these scarce coals, both hard and soft, is required to assure that the consumers who must have them receive at least enough for their minimum needs.

THE COAL OUTLOOK

Programs of the Solid Fuels Administration for War designed to promote equitable distribution and assure the coal supply for essential users during the next fiscal year should prevent much of the maldistribution which would otherwise be caused by production deficiencies in particular anthracite and bituminous coals. Moreover, an extensive system of field offices, coupled with the work of industry committees, should provide a rapid check on coal supply conditions and permit action to be taken in time to avert the development of emergency conditions.

Also, in the event that unavoidable emergencies arise, the machinery is now functioning to divert coal rapidly to meet the immediate needs of industrial and domestic consumers.

Under present conditions, the individual industrial and domestic consumer will get the greatest coal protection by cooperating with his supplier to:

1. Store as much of his equitable share of coal as his supplier can furnish before the start of the next heating season.
2. Substitute available and suitable alternative coals, as far as possible, for the use of the scarce fuels.
3. Exercise the utmost conservation in the use of the fuel that he is able to obtain.

Coal Mines Administration

C. J. POTTER, Deputy Administrator



THE NATION'S coal mining industry, of which possession was taken by the Government when it was paralyzed by a general strike, was back in private control before the end of the fiscal year, with harmony restored between management and labor and with production at a wartime peak.

Affairs of the Coal Mines Administration, set up by the Secretary of the Interior to administer Government possession of the mines, were being liquidated as the fiscal year ended.

All but 2 of the mines had been turned back to their owners 13 months after possession of some 3,300 strike-bound pits was taken by the Government to restore and maintain full coal production essential to the successful prosecution of the war.

During the period of Government possession :

A strike-bound, demoralized industry was restored to full operation without bloodshed or use of force, despite the almost hopelessly tangled relations between the mine workers and the operators.

Working time was substantially increased and the miners redoubled efforts to get out the coal under a Government wage contract which provided for no increase in the basic rates of pay specified by their pre-war contract with the operators.

All previous bituminous coal production records were broken and anthracite was at wartime maximum in an industry that for years has failed to operate in the absence of a contract between its owners and employees.

Mine workers and operators were finally brought together on a mutually acceptable wage contract within the National Stabilization Program, and the mines were quickly restored to private possession and control.

The Secretary of the Interior first took possession of the coal mines on May 1, 1943, under an Executive order of the President after general strikes had practically halted mining operations and curtailment of war production was being threatened by coal shortages. The strikes resulted from a break-down in wage contract renewal negotiations between the operators and mine labor.

The initial take-over was carried out by the Solid Fuels Administration for War. However, that agency had been established primarily to regulate wartime coal distribution and early in July 1943, the Secretary set up the Coal Mines Administration to administer Federal possession of the coal pits.

After the first take-over, the miners voluntarily returned to work under arrangements made by the Secretary for operation under Government control. On June 25, 1943, the War Labor Disputes Act (Smith-Connally Act) became law, requiring a return of Government-possessed private properties to their owners within 60 days after they had attained the productive efficiency prevailing prior to the take-over. Under the terms of this law, and under the existing circumstances the mines were all returned to their owners by October 12, 1943, although no wage contracts for their operation had been concluded.

Sporadic strikes again broke out a day later, the miners refusing to stay on the job in the absence of a wage contract.

By November 1, strikes had become widespread and production had practically ceased. A new Presidential Executive order was then issued authorizing and directing the Secretary of the Interior once again to take possession of all mines in which production had been stopped or was threatened by strikes. The new order directed the Secretary to " * * * offer the duly constituted representatives of the workers' own choosing a contract or contracts governing the terms and conditions of employment for the period of the operation of the mines by the Government * * *."

The Secretary immediately called in representatives of the United Mine Workers of America and on November 3, after but a few hours of actual negotiation between representatives of the workers and of the Coal Mines Administration, reached an agreement as to the terms and conditions of employment to govern both bituminous and anthracite mines in the Government's custody.

This agreement continued in effect various changes in the former contracts which had been ordered by the War Labor Board and further, provided for an increase in the workday and for payment in the bituminous mines for portal-to-portal travel time in accordance with principles formally announced by the War Labor Board.

This contract was subsequently approved by the War Labor Board as being within the Stabilization Program.

Under the new Government-United Mine Workers agreement, so far as bituminous coal was concerned, assuming that 45 minutes were spent daily by the miners in travel inside the mine between the mine mouth and the working face, the miners agreed to work 8 hours a day at actual coal production instead of the 7 hours spent under the previous industry agreement. This new agreement later became the basis for a new contract between the operators and mine labor.

Under the agreement, payment of a basic wage of \$8.50 per day in the bituminous mines was authorized. This was the amount the miners would have earned for 8 hours of actual work under the old contract. Of this sum, 50 cents was counted as basic compensation for portal-to-portal travel time.

The contract provided no increase in the basic wage rate of \$1 per hour for straight time and \$1.50 per hour for overtime but it recognized that the bituminous miners were entitled to pay for inside travel time as well as worktime.

Under the new contract, the basic wage obtainable by inside day men in bituminous mines was \$57.06 per week for the new 8-hour work-day as contrasted to an average of \$45.50 per week for the 7-hour day under the old contract. The change required the men to stay underground 9 hours per day, which includes an average of 8 hours productive work, 45 minutes of travel time and 15 minutes for lunch, to earn \$8.50 per day.

The agreement between the Government and the United Mine Workers of America similarly provided for increased work by the anthracite miners. Under this agreement hard-coal miners contracted to reduce their customary 30-minute lunch period to 15 minutes. The 15 minutes given thereby became productive time for which compensation would be paid at the rate of 37.8 cents per day for each miner—the average overtime rate for that time on the job under the old industry contract.

In mid-November the Secretary of the Interior called together 29 of the principal owners and operators of bituminous coal and anthracite mining properties and urged them to negotiate a contract with the mine workers, pointing out that the execution of a firm contract was essential to settlement of the Nation's coal troubles. Two days later he convened a joint conference of the bituminous coal operators and representatives of the United Mine Workers to start them on the resumption of negotiations to work out a joint wage agreement within the framework of the November 3 Government agreement and the decisions of the National War Labor Board.

As a result of the deliberations of this group, an industry agreement was worked out to continue in effect until March 31, 1945. The agree-

ment was modeled on the Government contract and provided for a retroactive payment of \$40 in settlement of portal-to-portal travel time claims. At the request of the negotiators, the Secretary called a meeting in Washington on December 17, 1943, at which representatives of approximately two-thirds of the Nation's bituminous coal tonnage approved the new Supplemental Wage Agreement. The agreement was then submitted to the War Labor Board.

In the spring of 1944 widespread unrest developed among soft coal miners as a result of failure to execute the agreement and delay in making the \$40 retroactive payment. On May 19, 1944, the Supplemental Wage Agreement was approved by the War Labor Board and the Director of Economic Stabilization. The approval covered the entire agreement including the \$40 retroactive pay provision.

In the anthracite industry negotiations between operators and the miners eventuated on March 8, 1944, in a contract to remain in effect until April 30, 1945. The contract continued the provisions of the Government agreement as well as the other modifications which had been directed previously by the War Labor Board and compromised several controversies which had not yet been settled. It received War Labor Board approval on April 7. This contract was finally ratified by the mine workers after a tri-district convention in mid-June.

The Secretary of the Interior terminated Government possession of mines operated by the members of the Coal Producers Association of Illinois on December 20, 1943, after a contract had been executed with the Progressive Mine Workers Union labor in those mines. Possession of other mines was retained by the Coal Mines Administration after the receipt of an opinion of the Attorney General to the effect that the War Labor Disputes Act did not require that possession of mines be terminated if the absence of a firm wage contract constituted a continued threat to the maintenance of coal production.

On May 31, 1944, the Secretary terminated Government possession of bituminous coal company properties in six production districts which had executed the bituminous wage contract and had indicated their readiness to put it into effect immediately upon termination of Government possession. Between May 31 and June 21, mines of additional companies were released as information was received that they had either executed or were about to execute the wage contract and were ready to put it into effect.

On June 21, the Secretary released the mines of all coal companies, both anthracite and bituminous, then remaining in Government possession, except two. These were the bituminous mines of the Jewell Ridge Coal Corporation of Tazewell, Va., which was testing the va-

lidity of portal-to-portal payments in Federal courts. They were still in Government possession at the end of the fiscal year.

Administration of Government possession of the mines in 1943-44 was carried out with practically no interference with the normal management of the mining properties, and the coal mining operations continued to be for the financial account of the coal mining companies.

Executive heads of the various coal companies were designated as Federal operating managers of the mines and field staffs of Government trained men were established in the production districts to maintain contact between the Coal Mines Administration and the operating managers. The staff of the Coal Mines Administration itself was kept at minimum size by utilizing as far as possible the services of trained men already serving the Department of the Interior in the Solid Fuels Administration, the Bureau of Mines and the Bituminous Coal Division until that division was terminated in August 1943.

Mine output increased impressively during the period of Government possession in spite of steady manpower drains, the serious production losses in the strikes and sharp increases in the average age of miners. For 1943 as a whole, bituminous production totaled 589,000,000 tons, the highest output on record. Anthracite output totaled 60,644,000 tons, the highest production in 14 years. In the first half of 1944, soft-coal production increased 12 percent and anthracite 13 percent over the first 6 months of 1943.

Besides the longer working day provided under the Government-mine workers' agreement, several programs sponsored by the Government undoubtedly contributed to this achievement. Most important of these was the 6-day-week program. Shortly after the Government takeover, instructions were issued to all operating managers to afford the men an opportunity to work the sixth day. This resulted in more general 6-day operation than had been the case previously.

The miners were afforded an opportunity to work during the usual holiday and vacation periods. As a result, very substantial tonnages of coal were produced on various days in 1943 and 1944 ordinarily observed as holidays in the mines. Production was also maintained during the scheduled vacation period of 1943 and operators and miners in 1944 made supplementary agreements to eliminate the vacation period.

A Sunday work program was instituted in the anthracite mines in February 1944, by agreement with the operators and miners. In the four Sundays of that month, nearly 600,000 tons of hard coal were added to the Nation's supply. At the same time, the month's output on the usual working days was raised 100,000 tons over that in January.

While the mines were in Government possession, Coal Mines Administration officials worked continuously to settle and prevent the day-to-day strikes which ordinarily occur in individual mines as a result of local disputes. Other programs included an investigation of the operation of company-owned commissaries and an intensification of health and safety activities. Fewer lives were lost per million tons of coal mined between November 1, 1943, and May 30, 1944, than in any comparable period on record.

Petroleum Conservation Division

J. W. STEELE, Acting Director



THROUGH foresight of Congress the Connally "Hot Oil" Act was enacted February 22, 1935, delegating to the President prescribed powers "to regulate interstate and foreign commerce in petroleum and its products by prohibiting the shipment in such commerce of petroleum and its products produced in violation of State law, and for other purposes." Primarily designed "to encourage the conservation of deposits of crude oil within the United States" the Petroleum Conservation Division was created to effectuate the expressed intention of Congress.

Acting through the Secretary, as the designated agent of the President, the functions of Petroleum Conservation Division are to assist in the prescribed administration of the act, to cooperate with oil and gas producing states in the prevention of waste and the adoption of uniform oil and gas conservation laws, and to keep informed as to the movement in interstate commerce of petroleum and its products with respect to its parity between supply and consumptive demand.

Regulations were promulgated requiring, among other things, the keeping of books and records and the filing of reports by those respectively engaged in producing, shipping or transporting, and refining petroleum within designated areas.

FEDERAL PETROLEUM BOARD

Federal Tender Board No. 1 was established at Kilgore, Tex., to enforce the Connally Act by administration of regulations promulgated thereunder and to regulate the movement in interstate commerce of petroleum from designated areas. This Board, under supervision of the Petroleum Conservation Division, continued its prescribed func-

tions until October 27, 1942, when it was superseded by the present Federal Petroleum Board in pursuance of Order No. 1753-A.

While the Connally Act is applicable to any State having conservation laws regulating production of petroleum, regulatory operations of Federal Petroleum Board are now confined to 106 counties in Texas, the 2 principal oil producing counties in New Mexico, and the entire State of Louisiana. The major oil producing and refining sections in the Southwest are within these areas. Eliminating fields of minor commercial significance, there are 557 oil fields, containing 64,584 oil wells, producing daily an average of 1,914,500 barrels of crude oil; 79 refineries processing daily an average of 1,446,000 barrels of petroleum products; and 128 gasoline plants producing daily an average of 105,500 barrels of casinghead gasoline and liquefied petroleum gases.

The counties within Texas and New Mexico which were excluded from the designated areas contain fields incapable of producing oil in excess of the amounts permitted by State laws and are therefore not subject to prohibitions prescribed by the Connally Act. The administration of prescribed regulations would, in such fields, be an unwarrantable burden on the industry and an unnecessary expense to the Government. For similar reason, the required filing of reports by producers has been suspended in certain fields within the designated areas.

The enforcement of the act and administration of the regulations is essentially a specialized field operation requiring, among other things, physical inspection of properties and facilities of oil operators. This function is necessary to maintain effective control over the interstate movement of petroleum and petroleum products. As a result of this control, illegal practices are reduced and a maximum compliance with conservation laws is maintained in oil operations.

Extensive activities of Federal Petroleum Board have been somewhat curtailed by reduction in experienced personnel and other wartime handicaps, yet the volume of criminal investigative operations has been maintained at a comparatively high level.

During the fiscal year 41 criminal investigations were initiated which, together with 4 investigations in progress at the close of the preceding year, were disposed of as follows:

One case was successfully prosecuted; 27 were concluded administratively because of insufficient and inconclusive evidence; and 2 were closed by action of the Attorney General. At the close of the year, 2 cases were pending with the Department of Justice, 3 were pending trial on dockets of United States District Courts, 1 case was in process of transmittal to the Department of Justice for prosecution, and 5 cases remained under investigation.

At the beginning of the year eight criminal cases were pending with the Department of Justice. Two cases were successfully prosecuted, five were closed because of inconclusive evidence, and one was pending June 30, 1944.

Of seven criminal cases pending in Federal courts at the beginning of the year, six were successfully prosecuted and one remained pending trial on June 30, 1944.

In the nine cases successfully prosecuted fines aggregating \$7,430 were assessed and several suspended sentences were imposed.

General Land Office

FRED W. JOHNSON, Commissioner



NEW LEGISLATION to modernize present Federal land laws is one of the requirements essential to the most effectual use of the millions of acres of public land in the continental United States and Alaska under the jurisdiction of the General Land Office. Only through the enactment of such remedial statutes can the maximum benefits under national conservation safeguards be assured with which to meet current and post-war demands for the utilization of natural resources. Moreover, this fundamental need, firmly established by land administration experience in connection with the war, is an integral factor in the adequate handling of the after-the-war responsibilities of this Federal organization which for 132 years has served as the official real estate agent of the Government.

The needs for up-to-date laws are numerous and are reflected in virtually every field of public land administration. Specifically, however, there are at least five major points at which service to the public is being hampered by lack of adequate statutory authority to act. These are outlined in the following:

RECOMMENDATIONS

1. Mechanized warfare has shown beyond a doubt that minerals are the sinews of modern war and unequivocally demonstrated the necessity for the highest degree of efficacy in our national mineral economy. That goal is not possible of attainment without a rejuvenation of our Federal mining laws. The experience of the first few months of the emergency when our admittedly superior technical and industrial skill was handicapped by a lack of readily available raw mineral materials, must not be repeated. The gravity of the situation is aggravated by the fact that generally speaking, the United States had the materials at all times, but because of antiquated statutes, was unable to find out what and where they were.

Specifically, the vast areas of public lands and lands acquired under the National Industry Recovery Act, the Bankhead-Jones Farm Tenant Act and various relief appropriation and rehabilitation acts constitute a veritable storehouse of essential minerals. Under present statutes, no method exists by which the United States may catalog and in cooperation with private initiative develop the resources on those acquired lands through leases based on sound principles of conservation. Such legislation as will enable the marshalling of our full complement of mineral resources is a necessary adjunct to adequate stock piling not only for current needs but also for future post-war or emergency demands. Moreover, the application of the leasing system to the acquired lands would be particularly advantageous, since it would allow those lands, which are in large part situated in or near well-settled areas, to be used contemporaneously for mining and for numerous essential surface uses.

Similarly, except for the fuel and fertilizer minerals in the public lands, no authority at present exists for supervising the mining of other minerals owned by the United States. No real mineral conservation is possible without such authority. A general leasing system would supply not only the power to conserve but would enable the Government to classify and catalog its mineral resources on these lands also. Finally, the accumulation of knowledge of the allocation of mineral deposits which would naturally result from a leasing system, would prove a valuable defense element in time of war.

2. One of the elements essential to successful administration of the public domain is complete, authentic information as to the character and status of the land. At the present time, evidence of the filing of thousands of unpatented mining claims is not made a matter of Federal record, but is merely registered in county recording offices. The enactment of legislation to enable the recording of such evidence in the General Land Office is urgently recommended. The decided advantage of such a system was clearly demonstrated during the earlier stages of the war when time-consuming search of county offices had to be made before land could be made available for troop-training and other military purposes.

3. One of the most serious handicaps to proper administration of the public domain during the post-war period is expected to be the lack of any facilities by which detailed information can be secured concerning the real-estate holdings of the various branches of the Federal Government. The establishment within the General Land Office of a centralized, consolidated inventory of all such land records is recommended as a solution of this problem.

4. Plans for land settlement in Alaska call for the utmost in service and safeguards for the public if development of the Territory is to be attained on a permanently stabilized basis. Protection against ill-

advised use of the public domain in Alaska, similar to that afforded on the mainland through the requirements for classification of land tracts for the best use to which they may be put, would do much to promote the stability of its economic future. The passage of legislation making such classification statutes applicable to the public domain in the Territory is urgently recommended.

5. The need for the utmost development of natural resources consistent with nonwasteful use is apparent from even the most cursory survey of post-war requirements. The world-wide pressure for forest products resources, food, fiber, or leather furnished in part from the public domain will call for the highest possible efficiency in the administration of the public lands. Greater protection of the public lands and their resources from dissipation would be afforded by the enactment of a uniform Federal trespass law.

POST-WAR PLANNING

Besides the necessity for modern laws, an adequate response to the prospective heavy demands for natural-resource materials in the rehabilitation of a post-war world entails a need for coordinated planning after the war. Such a program encompassing many aspects of settlement, resource development and other problems in land administration already has been set under way by the General Land Office. The scope of this work is indicated below.

ALASKA

Popular interest in the Territory of Alaska has reached new heights. The presence of American troops, the construction of the military highway system, and the influx of civilian workers on the many construction projects in Alaska have focused attention upon the possibilities of the area for permanent homes. In advance of anticipated post-war demands, trained technicians were sent to the Territory by the General Land Office near the end of the fiscal year, in order that plans could be ready for an orderly development of land-settlement activities which will safely avoid the disastrous ghost-town experiences of earlier settler days on the mainland. Meantime, deluged with requests for information, the Office distributed tens of thousands of leaflets and other publications setting forth the basic requirements for land settlement in the Territory under Federal law. The principal point stressed in all this material is the fact that, contrary to popular belief, it is not possible to secure public land on an "order by mail, sight unseen" basis, since Federal statutes require personal inspection and full knowledge of the general characteristics of any piece of land for which application may be made.

Coupled with the land settlement problem is the need for the identification through official surveys executed by the Cadastral Engineering

Specifically, the vast areas of public lands and lands acquired under the National Industry Recovery Act, the Bankhead-Jones Farm Tenant Act and various relief appropriation and rehabilitation acts constitute a veritable storehouse of essential minerals. Under present statutes, no method exists by which the United States may catalog and in cooperation with private initiative develop the resources on those acquired lands through leases based on sound principles of conservation. Such legislation as will enable the marshalling of our full complement of mineral resources is a necessary adjunct to adequate stockpiling not only for current needs but also for future post-war or emergency demands. Moreover, the application of the leasing system to the acquired lands would be particularly advantageous, since it would allow those lands, which are in large part situated in or near well-settled areas, to be used contemporaneously for mining and for numerous essential surface uses.

Similarly, except for the fuel and fertilizer minerals in the public lands, no authority at present exists for supervising the mining of other minerals owned by the United States. No real mineral conservation is possible without such authority. A general leasing system would supply not only the power to conserve but would enable the Government to classify and catalog its mineral resources on these lands also. Finally, the accumulation of knowledge of the allocation of mineral deposits which would naturally result from a leasing system, would prove a valuable defense element in time of war.

2. One of the elements essential to successful administration of the public domain is complete, authentic information as to the character and status of the land. At the present time, evidence of the filing of thousands of unpatented mining claims is not made a matter of Federal record, but is merely registered in county recording offices. The enactment of legislation to enable the recording of such evidence in the General Land Office is urgently recommended. The decided advantage of such a system was clearly demonstrated during the earlier stages of the war when time-consuming search of county offices had to be made before land could be made available for troop-training and other military purposes.

3. One of the most serious handicaps to proper administration of the public domain during the post-war period is expected to be the lack of any facilities by which detailed information can be secured concerning the real-estate holdings of the various branches of the Federal Government. The establishment within the General Land Office of a centralized, consolidated inventory of all such land records is recommended as a solution of this problem.

4. Plans for land settlement in Alaska call for the utmost in service and safeguards for the public if development of the Territory is to be attained on a permanently stabilized basis. Protection against ill-

advised use of the public domain in Alaska, similar to that afforded on the mainland through the requirements for classification of land tracts for the best use to which they may be put, would do much to promote the stability of its economic future. The passage of legislation making such classification statutes applicable to the public domain in the Territory is urgently recommended.

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Besides the necessity for modern laws, an adequate response to the prospective heavy demands for natural-resource materials in the rehabilitation of a post-war world entails a need for coordinated planning after the war. Such a program encompassing many aspects of settlement, resource development and other problems in land administration already has been set under way by the General Land Office. The scope of this work is indicated below.

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Service of additional tracts of the public land in the Territory. Some idea of the task confronting the General Land Office in this respect may be gained from the fact that only 2,322,079 acres of the total land area of 365,481,600 acres have as yet been surveyed. While, of course, all of the remaining 363,159,521 acres of unsurveyed land will not be included in even the most extensive post-war plans, since it contains mountainous terrain and other tracts not adaptable to use, nevertheless the cadastral measurement of land areas as a step toward proper settlement activities will be a necessary part of the post-war program.

The resumption of tourist travel in Alaska and the growth in the population expected to result from the increased settlement after the war will involve greater responsibilities for forest fire protection than those now borne by the Alaskan Fire Control Service. This branch of the General Land Office, which has just completed its fifth year of operation can, upon the cessation of the war emergency, be expanded to meet the urgent needs of post-war conditions in the Territory.

SOLDIER SETTLEMENT

American service men and women have become more land-conscious than any group of comparable numerical strength in recent years. Trained in camps far from their homes, and later transferred to foreign lands, they have acquired a yearning for a home of their own, which in many instances means a homestead on Government land. The furnishing of an adequate number of land areas to meet that demand is another high priority problem facing the General Land Office in the postwar era. Its solution is complicated by the fact that homesteading, as popularly understood, was first set under way by President Abraham Lincoln 82 years ago and that, as a consequence, good farm land upon which an agricultural living can be made as required by the homestead law, is scarce on the vacant, unappropriated and unreserved public domain in the United States which still remains in Federal ownership. This does not apply to the public land in Alaska, where good agricultural areas still are open to settlement, nor, obviously, to such farm lands as may be made available on Federal reclamation projects.

Meanwhile, another and broader opportunity for land settlement by World War veterans as well as civilians is afforded under the terms of a law which authorizes the lease or sale of not to exceed 5 acres of public land for home, camp, cabin, health, convalescent, recreational, or business purposes. Popularly known as the "small sites" act, this law does not require the making of a living by agriculture upon the land. In order properly to care for the postwar expansion in this type of land settlement, field parties of the General Land Office were engaged during the past year in the classification of areas of the public domain suitable for such use, and informational material setting

forth the location of the tracts and the legal requirements for their settlement was made available to the public.

The gratitude of the Nation for its fighting forces has always been reflected, after other wars, in the granting of special privileges to veterans in the acquisition of the public land. Credit for military service, for example, was given in meeting the time requirements involved in securing land under the homestead laws. The extension of similar credit to veterans of this war is authorized in legislation advocated by the General Land Office which had passed the House of Representatives, but not the Senate, by the end of the fiscal year. Its final approval will prove another favorable factor in soldier settlement plans in the postwar period.¹

TRAINING AREAS

A segment of the public domain equal to half the total land surface in New York State has been directly dedicated to war purposes. Some set aside for national defense use even before Pearl Harbor brought a formal declaration of war, these 15,400,000 acres withdrawn by public-land orders or Executive orders swiftly were transformed into troop training areas, target ranges, tank maneuver grounds, aerial bombing ranges, and other forms of military reservations. All of these lands were mustered into active service only for the duration of the war, with the stipulation that the tracts would return to their "civilian" status in the public domain 6 months after Presidential proclamation that the emergency is at an end.

The fitting of these "demobilized" lands into the post-war economy will constitute another element in General Land Office activities. Some of the tracts, formerly so isolated as to be of minor use, now are made more accessible by the construction of military roads and other improvements. Whether tracts of such a type will present additional opportunities for small site or other form of settlement after the war is a major angle to the postwar land administration problem.

NATURAL RESOURCES

A broader responsibility in the conservation of natural resources on the public domain forms still another factor in General Land Office operational plans for the period after the war. Widening the scope of these activities, Congress during the past fiscal year passed a law extending the policy of sustained yield timber management to all the public land. The application to the entire public domain of this principle which has been so successful in the development and pro-

¹ This act (Public 434) was approved by the President on September 27, 1944. It gives credit up to 2 years for military service in meeting residence and cultivation requirements under the homestead laws, and grants veterans during the next 10 years a 90-day preference right of application under the homestead or desert land laws, and the small site leasing act.

duction of forest products on 2,500,000 acres of revested Oregon and California railroad grant lands, is calculated to prove a distinct contribution in the solution of postwar economic problems.

The resumption on an enlarged scale of operations by the Range Development Service, curtailed during the emergency, will be an integral part of plans for securing the maximum benefits from the use of natural resources on the public domain in the production of food after the war. This program of conservation carried on in cooperation with livestock men who use the public range outside Federal grazing districts for feeding and watering their cattle or sheep will provide technical assistance in combatting soil erosion, the construction and improvement of watering facilities, and the fencing and reseedling of grazing areas.

The part that the public lands may play in the expansion of air-borne transportation facilities after the war already is a matter of study by the General Land Office. Under existing Federal statutes, it is the responsibility of the office to lease portions of the public domain for use as airfields by municipalities or private individuals; consideration currently is being given to the problem of whether amendment of the laws might not be advisable to permit the leasing of public lands for landing fields and repair shops in glider operations as well as airplane flights.

THE YEAR IN REVIEW

With many of its field offices reporting an upswing in "over the counter" business similar to that which prevailed in the General Land Office as a whole, a review of activities for the fiscal period ending June 30, 1944, reveals an outstanding record of accomplishment under national conservation policies.

RECEIPTS AND EXPENDITURES

Not the least of the year's achievements was the financial benefit accruing to the American taxpayer from the General Land Office operations. Total receipts for the 1944 fiscal year were \$14,355,342, the highest since 1924, and more than \$4,597,000 greater than the previous fiscal period. This was the third time since 1880 that receipts of the General Land Office have exceeded \$14,000,000.

Total operating expenses of \$2,321,664 were only \$17,000 more than the previous year, with the result that the ratio of receipts to expenditures in 1944 was \$6.18 in income for every \$1 of outgo, the highest ratio in a decade and nearly double that attained in 5 of the last 10 years.

MINERAL WORK BREAKS RECORDS

All records for the largest amount of money ever offered to the United States Government for the privilege of drilling for oil on one

acre of Federal land were shattered twice in the same year by the General Land Office in leasing the public land for development of petroleum resources during the 1944 fiscal period. Oddly enough, both record-breaking bids were offered for land in the same area—the Elk Basin oil and gas-producing field in Wyoming. In August 1943 a bid of \$5,800 smashed all previous high offers for 1-acre drilling rights. Three months later, a bid of \$26,216.21—nearly five times greater than the previous high mark—was made to set a new world's record for peak value per acre of Government oil land. This unprecedented price was offered for land in the Elk Basin field which comprised one of seven parcels in the area which aggregated approximately 75 acres.

Nearly 3 million dollars was paid the Government during the year as bonus bids for the privilege of drilling for oil, a profit to the taxpayer which does not take into account the additional rental and royalties from production on the lands which accrue to the Federal Government under General Land Office lease operations. Federal lands in Wyoming made the largest contribution in bonus-bid revenues, the lease of 2,849.05 acres bringing a bonus of \$2,844,028.46. The lease of lands in Montana, New Mexico, Oklahoma, Utah, and Wyoming brought a combined bonus bid score for the year of \$2,874,454.

The net result of these and other financial transactions conducted by the General Land Office in the mineral field during the year was the collection of receipts totaling \$11,791,097. This constituted the second highest cash proceeds from mineral activities to the Government during the 24 years of operations under the Mineral Leasing Act of 1920, the peak of \$13,631,840 having been reached in 1924.

Bringing about a 25 percent increase in the amount of coal produced from the public lands during the year, the General Land Office contributed 9,061,045 short tons of fuel to keep war factories in operation in 1944. During the same period, a 10-percent increase was attained in the amount of petroleum produced from the public domain, 15 percent in potassium salts, and 18 percent in sodium salts.

Besides these direct contributions from the public domain, more than 70,800,000 acres were withdrawn for various war uses in connection with the development of strategic minerals, and 43,000 acres were provided under special licenses to defense plants for the extraction of strategic minerals.

BEST LAND USE STUDIED

Complex problems ranging from determining the status and disposal of 11 million acres of land ceded to the United States 75 years ago by the Ute Indians of Colorado to the designation of tracts suitable for settlement by returned war veterans placed heavy burdens upon the technical branches of the General Land Office during the 1944 fiscal year. Serving as the channel for authentic information and

statistical data upon which governmental procedures and Federal legislation may be based, the Research and Analysis Division completed its Federal land inventory covering four Western States and registered notable progress in the compilations affecting other areas of the public domain. Carried out with the assistance of the Civilian Public Service Camp in Elkton, Oreg., the inventory makes available for the first time in public land administration activities a complete set of county maps encompassing Nevada, New Mexico, Utah, and Wyoming, and showing the location of the public-land tracts and the several agencies of Government which exercise jurisdiction over the areas as of 1941.

Coequal with the task during 1944 of assembling and interpreting data on the scope, location and character of the public lands was the responsibility of the Land Classification Division in protecting the areas from unwise or wasteful use. A prerequisite to the disposal of any portion of the public domain under national conservation policies written into the Taylor Grazing Act of 1934, land classification involves the scientific determination of the best use to which the land may be put, and the approval or rejection of land use applications on the basis of these findings. One of the outstanding accomplishments of the Division during the year was the classification in advance of applications for use of areas of the public lands suitable for lease by ex-soldiers and others for home, camp, health, convalescent, recreational, or business purposes. In this way, opportunity has been afforded for speedy action on this feature of post-war land settlement problems.

OREGON AND CALIFORNIA REVESTED LANDS ADMINISTRATION

The furnishing of forest products for war and the taking of definite steps toward permanent economic stability of the lumbering industry and communities in the post-war period was the twofold task accomplished by the Oregon and California Revested Lands Administration during the 1944 fiscal year. This branch of the General Land Office was established in 1938 to carry out provisions of Federal law which require sustained-yield forestry management practices on 2,500,000 acres of land formerly included in a grant for construction of a railroad between Oregon and California, but now reverted into Federal ownership. Under the sustained-yield method of forestry management, timber-cutting is limited to the extent which will insure a continuous supply of raw materials for the industry and communities dependent upon it for existence. Replenishment of the forests is fostered through tree planting, reseeding of denuded areas, fire protection and other forest conservation practices.

Containing one of the finest stands of Douglas Fir trees in the United States, the Oregon and California lands have been called upon for valuable contributions to the Nation's war needs, furnishing forestry products ranging from heavy construction and bridge timbers to airplane woods. In the past year, sales of timber from these lands exceeded 390,063,000 board feet, valued at \$1,361,991. More than \$900,000 of the proceeds from these sales are scheduled to be paid to the 18 counties in Oregon in which the lands are situated, in accordance with Federal statutes.

Plans to activate the program for setting up operating units in the Oregon and California land structure laid aside on account of the war emergency, were carried forward during 1944. Under this program, the economic selfsufficiency of the lumbering industry and communities in the region will be sought through the establishment of a marketing area to be served by the unit through a continuous flow of forest products insured under sustained-yield timber cutting.

Further augmenting the post-war program for betterments in the industry on the Pacific coast is the planting of seedlings on the denuded land by the Oregon and California organization. Utilizing the services of Civilian Public Service Camp enrollees, a total of 1,650,000 young trees were planted during 1944. Many of these seedlings were grown in nurseries maintained by the General Land Office.

CADASTRAL ENGINEERING SERVICE

Scientific land measurements which have been basic in the administration of the public domain since the earliest days of the Republic were carried on by the Cadastral Engineering Service in 1944 as an essential part of the conduct of the war. Differing from the type of survey work which involves primarily the recording of geologic, geographic, or historic features of the terrain, cadastral surveying consists of careful measurement of areas on the ground, for use in connection with administration of the public lands, and the recording of such measurements by the placing of monuments or other markers, and the preparation of maps scientifically compiled from field notes made by trained engineers at the time of the on-the-ground measurements.

Although sharply curtailed by wartime restrictions upon funds, personnel, and materials, these survey activities nevertheless were maintained in 17 States and Alaska during the year. Centering its operations primarily upon projects directly connected with the war, the Service, through 86 field groups and facilities maintained in 13 public survey offices, responded to requests for technical assistance from the Army and Navy and 6 other agencies of the Government, in addition to the work-schedule of the General Land Office.

As a result of these operations, more than 1,352,800 acres of land were surveyed or resurveyed during the course of the year, embracing projects essential to the war-connected livestock industry, timber resources, and power sites for war and post-war purposes. Meantime, approximately 44 million acres of land await survey by the Service as the result of approved projects. Study of these projects with a view to their inclusion in an expanded survey program to be undertaken with the return of normal peace-time conditions, formed a part of the workload in the last fiscal year.

BRANCH OF FIELD EXAMINATION

One of the primary agencies of Government in bringing about the best use of the public lands in the interest of conservation and the public welfare is the Branch of Field Examination. Its activities during 1944 ranged from finding new pastures for ranchers engaged in raising livestock for the war to the subterranean tracing of deprecations which 42 years ago resulted in the unlawful mining and removal of more than 200,000 tons of coal from the public domain.

Particularly important to the war are the operations of this organization in the investigation of mining claims on sites selected for military purposes. As a result of these examinations, undertaken at the request of either the War or Navy Department, many thousands of abandoned claims have been eliminated with a saving of thousands of dollars in the acquisition of the lands. In one region alone, it was discovered that, out of several thousand mining locations examined, only three were maintained in accordance with existing law, and these three were appraised and purchased by the War Department.

The examination of land upon which is based the rejection or approval of plans for its use under the public land laws, is a major responsibility of the Branch. Similar investigatory work in connection with tracts of the public domain outside Federal grazing districts which are sought for livestock raising, was another task confronting the field examiners in 1944. In the course of these latter operations, some isolated areas overlooked by the ranchers and aggregating more than 150,000 acres were brought to the attention of the livestock men and made available for lease in order that the war food supply might be increased.

With its staff of trained technicians including mining and civil engineers, geologists, lawyers, auditors, timber cruisers, range specialists, and others experienced in land investigations, the Branch during the year handled many difficult and unusual types of cases. In the field of trespass upon the public lands there was, for instance, the case where trees had been lifted bodily and planted miles away, for landscape purposes, and, in the case of the pilfered coal, the BFE men had to dig their own mine shafts and face the dangers of fire damp

to determine the extent of the damage inflicted upon the public domain resources nearly a half-century ago.

ALASKAN FIRE CONTROL SERVICE

The Alaskan Fire Control Service completed its fifth year of activity on the public domain in Alaska in 1944 with a record of the lowest fire losses yet sustained during its operations in the Territory. However, despite cooperation between the various Federal agencies and the military forces in Alaska, coupled with unusually favorable weather conditions from the standpoint of fire protection, the Service nevertheless was called upon to suppress 61 fires which burned 53,686 acres during the year. Handicapped by restricted funds and personnel, it was powerless to undertake suppression work on 13 fires in other areas which consumed more than 180,000 acres.

From the military point of view, much valuable assistance was given in the prosecution of the war by the activities of the Service in the last 12 months. Numerous fires endangering military installations, encampments, equipment, etc. were suppressed by the personnel and equipment of this General Land Office agency. In addition, radio stations and other air navigational facilities were several times saved from destruction or impairment, while the air-lanes were kept unusually free of smoke, thus partially removing one of the annual hazards formerly confronting all air transportation in interior Alaska.

One of the world's largest single fire-fighting districts, the responsibilities of the Alaskan Fire Control Service embrace more than 250 million acres of public domain, including approximately 40 million acres of forests, 110 million acres of open woodland and grassland and 100 million acres of sometimes dry and inflammable tundra areas.

GRAZING ON PUBLIC LANDS

More acres of public land outside Federal grazing districts than ever before were utilized under lease from the General Land Office in 1944 for the production of food, fiber, and leather for military and civilian needs. Registering an increase of more than 400,000 acres over the previous year, a total of 12,440,210 acres of public land in continental United States and Alaska were made subject to use under 10,020 separate leases involving annual rentals of \$227,308.

In addition to the activities for augmenting the Nation's supply of livestock products afforded by the leasing of the public lands for grazing, the operations of the Range Development Service form an integral part of the progressive permanent land administration program under the supervision of the General Land Office. Although its activities were restricted by wartime personnel and material shortages, this Service nevertheless worked on 134 projects designed to improve

stock raising conditions on more than 800,000 acres. Equipped to carry forward a broad program of range improvement; its work includes the development of watering facilities, replenishment of forage through reseeding and control of soil erosion. Working in close co-operation with the stockmen who contribute a portion of the labor and funds necessary to undertake the projects, the Service is prepared to put into effect a broad schedule of improvements when normal employment and supply conditions are restored.

THE PUBLIC LANDS

AREA OF THE PUBLIC LANDS

The area of public lands remaining in Federal ownership, including Indian trust and tribal lands, as of June 30, 1944, amounted to about 400 million acres in the public land States, and about 365 million acres in Alaska. Approximately 393 million acres of these public lands were vacant and unreserved as follows: 37 million acres in the States outside of Federal grazing districts; 131 million acres within such districts; and 225 million acres in Alaska.

Of the approximately 778 million acres remaining in Federal ownership in the States and Alaska, 118 million acres in the States and 363 million acres in Alaska were still unsurveyed as of June 30, 1944.

The total acreage patented with minerals reserved to the United States was increased during the year to 48,688,421 acres, as shown by the following table:

Acreage of lands patented with minerals reserved to the United States, as of June 30, 1944

Type of mineral reservation	Patented during fiscal year 1944	Total patented through June 1944
Reservation of all minerals:		
Under Stock Raising Act.....	38,803	33,570,958
Under other acts.....	116,303	2,325,572
Total.....	155,106	35,896,530
Reservation of specific minerals:		
Coal.....	15,948	10,870,531
Others ¹	11,649	1,921,360
Total.....	27,597	12,791,891
Grand total.....	182,703	48,688,421

¹ Includes coal reserved in combination with other minerals.

LEASES AND PERMITS

During the year an additional area of 594,366 acres was brought under lease, including mineral licenses and permits, making a total of 15,913,927 acres under lease at the end of the year. The types of leases in force June 30, 1944, are shown by the following tables:

Mineral leases, permits, and licenses outstanding,¹ as of June 30, 1944

Mineral	Leases		Permits		Licenses		Total	
	Number	Acres	Number	Acres	Number	Acres	Number	Acres
Coal.....	340	72,514	86	74,979	104	4,060	530	151,553
Oil and gas.....	² 5,238	2,970,918					5,238	2,970,918
Phosphate.....	9	5,364					9	5,364
Potash.....	20	47,292					20	47,292
Sodium.....	4	1,874	73	109,499			77	111,373
Total.....	5,611	3,097,962	159	184,478	104	4,060	5,874	3,286,500

¹ Does not include permits granted to Federal war agencies.² Does not include 18 leases within naval reserves (9,199 acres).*Leases other than mineral leases outstanding, as of June 30, 1944*

Type of lease	Number	Acres	Annual rental
Aviation.....	43	28,936.27	\$525.00
Fur farm (Alaska).....	19	133,810.00	775.00
Grazing (Alaska).....	9	1,168,953.93	1,269.35
Grazing (Oregon and California).....	192	306,302.79	7,444.13
Grazing (Taylor Act, sec. 15).....	10,020	10,964,952.78	218,594.60
Recreational.....	22	21,049.78	¹ 1,372.63
Scruggam Act.....	8	796.89	² 19,606.00
Small sites (5-acre tracts).....	403	1,989.96	³ 1,995.00
Water well.....	12	480.00	485.50
Others.....	3	153.01	10.00
Total.....	10,731	12,627,427.41	252,076.21

¹ Does not include rental of 1 lease, the rental of which is based on receipts.² Sale price of timber authorized to be cut.³ Does not include rental of 4 business site leases, the rentals of which are based on receipts.

In addition, 634,800 acres were being used at the end of the year by Federal and local agencies, private individuals, and corporations under permit by the Commissioner of the General Land Office. War agencies held temporary Departmental permits for the use of about 22 million acres of public lands.

HOMESTEADS, SALES, AND OTHER ENTRIES

A decline in the number of entries on the public lands in continental United States was experienced during the year, the number of new homesteads decreasing from 213 during the fiscal year of 1943 to 158 during 1944. The number of new homesteads in Alaska, however, increased from 79 to 94.

The following tables show the new entries and selections allowed, the entries finally approved, and the patents and certificates issued during the year. At the end of the year 4,302 entries embracing 663,796 acres were pending awaiting further compliance with the public land laws by entrymen or final action by the General Land Office.

Original entries and selections¹ fiscal year 1944

Type of entry or selection	Public lands		Ceded Indian lands		Total	
	Number	Acres	Number	Acres	Number	Acres
Homestead entries:						
Stock raising.....	5	2,320.00			5	2,320.00
Enlarged.....	3	785.74			3	785.74
Reclamation.....	12	1,336.53	1	180.00	13	1,516.53
Forest.....	4	306.52			4	306.52
Sec. 2289 R. S., et al.....	133	14,939.01			133	14,939.01
Total homestead entries.....	157	19,687.80	1	180	158	19,867.80
Other entries and selections:						
Desert land entries.....	30	4,246.05			30	4,246.05
State selections.....	109	58,359.02			109	58,359.02
Timber and stone applications.....	3	99.78			3	99.78
Mineral applications and adverse claims.....	69	7,964.78			69	7,964.78
Town lots ²	24	(³)			24	(³)
Other.....	3	42.82			3	42.82
Total other entries.....	238	70,712.45			238	70,712.45
Grand total.....	395	90,400.25	1	180	396	90,580.25

¹An original entry or selection is one made in pursuance of an act of the Congress which prescribes the terms and conditions under which patent may be issued or other evidence of title granted. An original entry becomes a final entry upon compliance by the entryman with further requirements of the law, such as residence or additional payment, and upon the issuance of a final certificate. A State selection becomes final upon certification by the Commissioner of the General Land Office.

²Town lots upon which only part payment was made.

³Area not tabulated.

Final entries¹ fiscal year 1944

Type of entry	Public lands		Ceded Indian lands		Total	
	Number	Acres	Number	Acres	Number	Acres
Homestead entries:						
Stock raising.....	56	26,685.35	1	400.00	57	27,085.35
Enlarged.....	5	1,096.03			5	1,096.03
Reclamation.....	139	15,640.81	9	972.49	148	16,613.30
Forest.....	3	135.31			3	135.31
Commuted.....	1	141.58	16	1,178.78	17	1,320.36
Sec. 2289 R. S., et al.....	80	6,948.43	8	520.00	88	7,468.43
Total homestead entries.....	284	50,647.51	34	3,071.27	318	53,718.78
Other entries:						
Desert land entries.....	22	2,731.38			22	2,731.38
Public auction sales ¹	135	11,031.17			135	11,031.17
Timber and stone entries.....	3	99.78			3	99.78
Mineral entries.....	96	7,881.68			96	7,881.68
Town lots.....	207	(²)	48	(²)	255	(²)
Miscellaneous cash entries.....	54	8,962.06			54	8,962.06
Other.....	7	430.40			7	430.40
Total other entries.....	526	31,136.47	48		574	31,136.47
Grand total.....	810	81,783.98	82	3,071.27	892	84,855.25

¹A final entry is one upon which final certificate has been issued showing that the law has been complied with and that in the absence of irregularity, the entryman or claimant is entitled to a patent. If the requirement of the law has been met, the equitable title to the land passes to the claimant upon the issuance of the final certificate.

²Isolated tracts.

³Area not tabulated.

Patents and certifications¹ fiscal year 1944

Type of patent	Public lands		Ceded Indian lands		Total	
	Number	Acres	Number	Acres	Number	Acres
Homestead patents:						
Stock raising.....	75	38,803.29			75	38,803.29
Enlarged.....	9	1,503.36	2	200.00	11	1,703.36
Reclamation.....	159	16,023.11			159	16,023.11
Forest.....	4	109.76			4	109.76
Commuted.....			1	40.00	1	40.00
Sec. 2289 R. S., et al.....	96	8,437.34	1	160.00	97	8,597.34
Total homestead patents.....	343	64,876.86	4	400.00	347	65,276.86
Other patents:						
Desert land.....	26	3,637.65			26	3,637.65
Public auction ²	132	10,808.07			132	10,808.07
Timber and stone.....	3	240.00			3	240.00
Mineral.....	100	7,487.05			100	7,487.05
Indian.....			128	³ 6,649.51	128	6,649.51
Miscellaneous cash sale.....	448	9,265.75			448	9,265.75
Exchange.....	125	195,597.80			125	195,597.80
State grants.....	31	76,919.73			31	76,919.73
Curative and supplemental.....	191	(⁴)			191	(⁴)
Other.....	86	5,753.95			86	5,753.95
Total other patents.....	1,142	309,710.00	128	6,649.51	1,270	316,359.51
Total all patents.....	1,485	374,586.86	132	7,049.51	1,617	381,636.37
Certified to States.....		20,087.88				20,087.88
Grand total.....	1,485	394,674.74	132	7,049.51	1,617	401,724.25

¹ Where upon final examination it is found that an entry or selection is in proper form and that the law has been complied with, a patent conveying the legal title to the claimant is issued. In the case of certain State selections, the legal title is conveyed upon approval thereof by the Secretary of the Interior and certification by the Commissioner of the General Land Office.

² Isolated tracts.

³ Indian tribal lands.

⁴ Acreage not counted because previously reported.

LAND GRANTS

Title to 102,185 acres was conveyed during the year in satisfaction of grants of land made to the States and railroads by the Congress for public purposes. Grants to States included 75,180 acres of park selections, 17,426 acres of indemnity school land selections, 2,662 acres selected for miners' hospitals, and 1,740 acres of swamp land. The Northern Pacific Railroad received 5,177 acres patented to it pursuant to the Transportation Act of 1940. In addition to these grants, 25 patents were issued to States to give them additional evidence of title to 569,575 acres of previously granted school sections.

A total of 249 applications for rights-of-way were approved during the year under laws which provide for the granting of rights-of-way over the public lands for telegraph and telephone lines, public roads,

pipelines and other purposes. Of the applications approved, 81 involved permits or easements calling for an annual rental of \$2,520 and 33 were temporary rights-of-way over the Oregon and California lands with an annual rental of \$340.

LAND EXCHANGES

Exchanges of land with private parties and local governments during the year resulted in the addition of 144,904 acres to grazing districts in exchange for 153,314 acres of Federal land; 13,553 acres to Indian reservations in exchange for 18,063 acres; 2,219 acres to the Oregon and California lands in exchange for 840 acres; and 361,778 acres to national forests in exchange for 23,381 acres of land and sufficient timber to equalize the values involved.

RECEIPTS AND EXPENDITURES

Receipts from all sources during the year totaled \$14,355,342. Mineral rentals, royalties, and bonuses accounted for 82 percent of the total receipts and sales of timber from the Oregon and California and Coos Bay lands for an additional 13 percent. The remaining 5 percent was realized from fees and commissions, sales of public and ceded Indian lands, rentals, fines and penalties, copying fees, and from miscellaneous sources.

Of the total receipts, 37 percent will be distributed to various States and counties and 43 percent will be credited to the reclamation fund. Except for \$13,098, which will be credited to Indian trust funds, and \$50,617 which will be credited to the range improvement fund, the remainder will be covered into the general fund of the Treasury.

Expenditures from appropriations amounted to \$2,321,664 distributed as follows: general, \$857,495; surveys, \$560,766; field examination, \$331,461; administration of the revested and reconveyed lands, \$257,966; district land offices, \$250,727; range improvements, \$32,986; and fire control in Alaska, \$30,263. Expenditures, aggregating \$286,374, were made from funds transferred to the General Land Office for the emergency protection of certain public lands and for soil and moisture conservation operations.

The following table shows the receipts earned during the year, by sources and by Treasury accounts.

Disposition of receipts of the General Land Office,¹ fiscal year 1944

Source of receipts	Covered in the Treasury earmarked for—				
	General fund	Reclamation fund	States and counties	Indian trust funds	Total
Sales of public lands.....	\$25,095.57	² \$90,000.00	³ \$2,000.00	-----	\$107,095.57
Fees and commissions.....	10,264.76	² 40,000.00	-----	-----	50,264.76
Mineral leases and permits:					
Mineral Leasing Act.....	1,091,397.48	5,729,836.78	4,092,740.56	-----	10,913,974.82
Red River oil and gas lands.....	-----	-----	3,582.93	\$5,971.54	9,554.47
Potash.....	58,788.08	² 358,754.91	220,455.30	-----	637,998.29
Other.....	⁴ 229,570.31	-----	-----	-----	229,570.31
Total mineral.....	1,379,755.87	6,088,591.69	4,316,778.79	5,971.54	11,791,097.89
Oregon and California grant lands..	885,112.83	-----	885,112.82	-----	1,770,225.65
Coos Bay grant lands.....	4,969.21	-----	² 20,000.00	-----	24,969.21
Taylor Act grazing leases.....	50,616.58	⁵ 50,616.58	101,233.17	-----	202,466.33
Rights-of-way leases.....	30,408.75	-----	-----	-----	30,408.75
Sales of reclamation town lots.....	-----	⁶ 13,608.65	-----	-----	13,608.65
Sales and lease of Indian lands.....	-----	-----	-----	7,126.23	7,126.23
Copying fees.....	17,343.36	-----	-----	-----	17,343.36
Miscellaneous.....	340,735.33	-----	-----	-----	340,735.33
Grand total.....	2,744,302.26	6,272,816.92	5,325,124.78	13,097.77	14,355,341.73

¹ Before final settlement of all accounts by the General Accounting Office.² Estimated.³ Includes \$50,117.50 collected in California under act of Oct. 2, 1917 (40 Stat. 297).⁴ Includes \$20,257.66 collected in Wyoming under act of June 26, 1926 (44 Stat. 1621), \$193,195.80 collected in California under Executive order 9087 dated Mar. 5, 1942, and \$16,116.85 collected in Alaska, of which \$260 were collected under the Mineral Leasing Act of 1920.⁵ Range improvement fund.⁶ Includes \$1,250 from sales of reserved reclamation lands.

Office of Land Utilization

LEE MUCK, Assistant to the Secretary



THE activities of the Office of Land Utilization are primarily of an advisory and coordinating nature. The assumption of administrative functions that should be performed by the bureaus and other units which form a part of the departmental organization are assiduously avoided. The office aids in every possible way in the formulation of plans for the improvement of administrative activities and takes the lead in the presentation to the Congress of the appropriation needs of the Department as a whole for soil and moisture conservation operations, white pine blister rust control, and emergency forest fire protection.

When such appropriations are authorized, they are allotted to the various action agencies of the Department in proportion to requirements as revealed by detailed reports. In such apportionment the office utilizes the experience gained by members of its force during many years of practical administration in responsible units of the Federal Government over widely distributed areas. The details of expenditure and the field supervision of construction, protection, and related activities are left primarily to the discretion of representatives of various administrative units. Supervision by the Office of Land Utilization is confined to the guidance of the action agencies in the selection of projects which can unquestionably qualify as appropriate activities under the justifications that have been submitted to the Bureau of the Budget and the Congress and upon the basis of which it is assumed the appropriations were made. The supervision of appropriations and coordination of types of projects to be undertaken is supplemented by field inspections and conferences with those in direct charge of field activities for the purpose of insuring that the final results achieved are consistent with the general purposes of the Department.

In the soil and moisture conservation program emphasis is constantly placed upon the restoration to former productiveness of range

lands and farm lands that have been subjected to improper use and it is insistently required that proper use be established as a condition precedent to the expenditure of Federal funds in a restoration plan. Attention is centered upon the proposition that only when the recovery of a range and the restoration of agricultural productivity can not be effected through the utilization of natural processes should expensive methods of control be used. The recuperative powers of nature are astonishingly effective in the correction of unfavorable conditions when the destructive agencies are removed. The artificial reseeded of a range may secure no better result than carefully regulated grazing will effect at a much lower cost. The construction of expensive masonry structures for the protection or restoration of eroding farm lands is authorized only when it is reasonably apparent that less heroic measures will not be effective.

In the problem of protecting forests from fire, disease, and insects there is generally less occasion for cautioning against precipitate expenditures than there is for encouraging alertness. The suddenness with which a forest fire may develop into an uncontrollable conflagration and the insidious manner in which a forest disease or insect infestation may spread before detection demand constant vigilance and prompt suppression without too anxious a calculation of the initial cost. The Office of Land Utilization need offer no apologies for its persistent advocacy of increased measures of forest protection, especially for the vast resources of Alaska which have never received the protection which their economic importance justifies.

SOIL AND MOISTURE CONSERVATION OPERATIONS

Under the provisions of the Soil Conservation Act of April 27, 1935 (49 Stat. 163), and the President's Reorganization Plan No. IV (54 Stat. 1234), soil and moisture conservation projects on lands under the jurisdiction of the Department of the Interior are coordinated through the Office of Land Utilization.

The impact of the war had a restraining effect on the scope and amount of work undertaken and, accordingly, the soil and moisture conservation program of the Department has been restricted to avoid conflicts in the use of labor, equipment, or materials that might be needed in the prosecution of the war. The practices and procedures followed have been adjusted to a wartime economy, with the emphasis on those projects and operations which would contribute to the winning of the war. Special emphasis has been placed on projects such as range reseeded, small water developments, water spreading, vegetative gully control, and similar projects that are low in cost, that can largely be accomplished through the use of local materials, and that fit in with the cooperation obtained from the users of the land.

Much of the soil erosion and water losses from the lands under the jurisdiction of the Department was occasioned by unsatisfactory use conditions on the upper portions of the various watersheds. These conditions were the result of ill-advised use or misuse over a long period of time. Continued use of these lands was necessary in the war program and the procedures adopted gave consideration to the necessity of maintaining use while correction of the unsatisfactory conditions was occurring. Accordingly, a major part of the effort of the Office of Land Utilization in the coordination of the program for the Department as a whole was to secure a maximum amount of cooperation from the users of lands under its supervision. This procedure was devised to develop interest in conservation by the users of the Federal lands and to accomplish a larger amount of work by obtaining contributions of labor, materials, and money. During the past year these contributions in value amounted to 50 percent of the amount appropriated by the Congress.

Close cooperation also was maintained by field offices of the land-management agencies with local soil conservation districts, pursuant to an interdepartmental cooperative agreement between the Department of Agriculture and the Department of the Interior, which recognized that the conservation of soil and moisture on Department of the Interior lands was a segment of the over-all national conservation policy.

The funds available during the past year, namely \$1,333,200 were less than at any time since the program started, but much progress was made in soil and moisture conservation by reason of the high degree of cooperation which prevailed.

The Department now is well organized for the prosecution of a sound program of soil and moisture conservation that is understood and supported by the land-management agencies and by a constantly increasing number of the users of its lands. With the continuation of the necessary funds for the work during the post-war years, marked progress can be made in the restoration and rehabilitation of those lands under the jurisdiction of the Department which now are in an impoverished condition. The program as a whole has been designed and procedures have been set up to effect a complete and coordinated rehabilitation program on a sound, practical basis.

COORDINATION OF WATER PROGRAMS

In recognition of the fact that programs designed to attain a closely coordinated plan in the field of land use could not be fully realized without a similar degree of coordination in the field of water development programs, the Water Resources Committee was established within the Office of the Secretary by Departmental Order No. 1946 under

date of May 2, 1944. The Water Resources Committee acts in an advisory capacity to the Secretary and its functions concisely stated are: the assembly of essential information covering the water-development programs of the bureaus and offices of the Department and other Federal, State, and private agencies; the review of all basic water-development projects or programs proposed to be undertaken by the bureaus and offices of the Department; the preparation for submission to the agencies concerned with water-development programs of statements covering various aspects of such programs with a view to providing definite information thereon and reconciling such conflicts with respect to water use as may develop; the conduct of hearings on problems concerned with the use and development of water resources for the purpose of resolving questions concerning policy; and the formulation of such recommendations to the Secretary as will insure an all-inclusive departmental water conservation policy.

The plan of coordination of land-management and water-development programs, which has been established in the office of the Secretary of the Interior, is a major forward step in the field of administrative management. It insures effective coordination at the top level of administration and the objective sought is achieved through the effective correlation of operating relationships at the lower administrative levels concerned with action programs in the field of land management and water utilization. The time is at hand when these principles of administrative coordination and integration should be extended to all Federal agencies engaged in these fields, for the effective use of land and water will not be at its best until all agencies dealing with these functions have coordinated and integrated their responsibilities and activities.

LAND CLASSIFICATION AND LAND POLICY

Because of the extensive areas and the variable character of the lands under the jurisdiction of the Department of the Interior, there is urgent need for the development of a unified policy of land management. As a part of the staff work for the Departmental Land Policy Committee, the office is cooperating with the land-management bureaus of the Department in preparing a succinct statement of the Department's policies for administering the agricultural, grazing, forest, wildlife, mineral, water, and recreational resources under its control; for acquiring lands needed for essential public purposes; and for disposing of public lands suitable for private ownership. The objectives sought are the clarification of existing policies, the coordination of conflicting policies and procedures, and the formulation of new policies where existing policies appear to be inadequate to protect or advance the public interest in the Federal lands.

PLANNING POST-WAR PUBLIC LAND IMPROVEMENTS

An integral part of the war program has been the planning for maintenance of employment in the post-war demobilization period, during which time men in the armed forces and workers in expanded war industries may be released faster than peacetime industries, with their difficult problems of reconversion, can absorb them. To provide a reservoir of employment opportunities, the land-administering agencies of the Department, in response to a letter from the President dated May 22, 1943, have submitted budgets for planning and blueprinting of construction projects which would produce, if needed, all or any part of an estimated 1,550,000 man-years of employment. The Office of Land Utilization assisted in the preparation of these programs for presentation to the Bureau of the Budget.

FOREST MANAGEMENT

The effect of the World War upon forest administration has been especially significant. The very unusual demand for forest products has been accompanied by a marked shortage of manpower and by an effort to control prices of logs and of manufactured forest products. Every facility for an increase in production has been afforded by the Department. Some operators have been able to increase their production. However, the total production from Department of the Interior lands has shown a reduction in volume over the preceding year. The total cut from Oregon and California revested and reconveyed grant lands was slightly below 400 million board feet with a stumpage value of \$1,321,641. The cut from Indian lands was 423 million board feet with a value of \$1,766,192. Relatively small amounts were cut from public lands in Alaska and the United States.

The act of August 28, 1937 (50 Stat. 874), providing for a conservative administration of the Oregon and California revested and reconveyed grant lands, was the first recognition in Federal law of the principle of cooperative sustained yield in forest management. During the past year this Department joined with the Department of Agriculture and other agencies in requesting from the Congress general legislation that would authorize sustained-yield agreements for all classes of public land administered by the Secretary of the Interior and the Secretary of Agriculture for timber production purposes. This important legislation was secured in the act of March 29, 1944 (Public, No. 273, 78th Cong.).

WAR RELOCATION AUTHORITY

The President, by Executive Order 9102 of March 18, 1942, created the War Relocation Authority, a nonmilitary agency with authority to formulate and carry out a program for the planned and orderly re-

location of persons evacuated from military areas. Acting pursuant to this Executive order, agreements were entered into between the Department of the Interior and the Director of the War Relocation Authority providing for the location of evacuee communities on lands under the jurisdiction of the Department. Agreements were consummated covering lands within the Tule Lake Reclamation Project, Calif., the Minidoka Reclamation Project, Idaho, the Heart Mountain Reservation Project, Wyo., the Colorado River Indian Reservation, Ariz., and the Gila River Indian Reservation, Ariz.

By Executive Order 9423 of February 16, 1944, the President transferred the War Relocation Authority from its status as an independent agency to the Department of the Interior. This action had the effect of eliminating any necessity for continuing further liaison activities by the Office of Land Utilization.

FOREST AND RANGE FIRE CONTROL

With \$530,000 appropriated by the Interior Appropriation Act of 1944, together with \$231,708 previous year balances reappropriated, the emergency fire control program of the Department of the Interior was continued during the year. This program, an essential war activity, supplements and augments normal fire protection for the forest and range resources situated on the forest, brush, and grass lands of the Department located within a 300-mile zone of the Atlantic and Pacific coasts and the Gulfs of Mexico and California.

There are approximately 400 million acres of forest, brush, and grass lands requiring protection from fire under the jurisdiction of the bureaus and agencies of the Department of the Interior in the continental United States and Alaska. Of this total acreage approximately 272 million acres lie within critical zones and have required special protection during the war. These lands support some of the finest stands of virgin timber left in the United States, together with other resources all of which are playing an important part in the present war emergency. Protection of these resources from sabotage, direct enemy action, and normal fire risks is a major responsibility of the action agencies of the Department of the Interior.

The responsibility of the Department to protect the resources and related strategic facilities located on or adjacent to lands under its jurisdiction has been most satisfactorily met during the past 2 years. The normal fire control protection organizations, assisted by approximately 500 trained guards and standby crewmen made available through the emergency fire protection program, were able to hold fire losses to low levels, and thus prevent the disruption or destruction of important war activities.

Cooperation between the Department of the Interior, the Department of Agriculture, and the War Department continued at a high level throughout the year. The Forest Fire Fighters Service perfected its organization and trained approximately 200,000 volunteer civilian fire fighters for prevention and suppression work in 44 States. The assistance rendered by the Forest Fire Fighters Service to all organized fire protection agencies has proved to be very valuable and especially so to some of the action agencies of this Department.

Excellent results have been achieved in the coordination of fire control work on all Department of the Interior lands during the war. However, provision has yet to be made for increased regular appropriations which will insure adequate protection for the entire 400 million acres under the management of this Department.

WHITE PINE BLISTER RUST CONTROL

White pine blister rust control operations on lands administered by the Department of the Interior were continued during the fiscal year 1944. These operations are designed to protect the valuable five-needle pines from the white pine blister rust, a fungus disease of foreign origin which became established in this country approximately 30 years ago. The actual control work consists of the eradication of *Ribes* (currant and gooseberry bushes), the alternate hosts of the disease. The act of April 26, 1940 (54 Stat. 168-169), provides that all white pine blister rust control operations be combined as one appropriation to be carried in the annual appropriation act of the Department of Agriculture. For the fiscal year 1944, \$170,747 was appropriated for white pine blister rust control work on Department of the Interior lands and made available to the National Park Service, the Office of Indian Affairs, and the Oregon and California Revested Lands Administration of the General Land Office.

Progress in the control operations on Department of the Interior lands during the war has been necessarily slow and has barely kept pace with the spread of the disease. In the calendar year 1943, 9,446 acres were worked for the first time and 15,143 acres were reworked.

CIVILIAN PUBLIC SERVICE CAMPS

Section 5 (g) of the Selective Training and Service Act of 1940, approved September 16, 1940 (54 Stat. 885), provided that persons who by reason of religious training and belief were conscientiously opposed to participation in war should not be subject to combatant training and service in the land or naval forces of the United States, and further provided for the assignment of such conscientious objectors to noncombatant service or to work of national importance under civilian direction.

Prior to July 1, 1943, all Civilian Public Service camps were sponsored by the National Service Board for Religious Objectors and the costs of operating the camps, except as to the work program, was financed by that organization. On July 1, 1943, Civilian Public Service Camp No. 111 was organized at Mancos, Colo., under the supervision of the Bureau of Reclamation, and full responsibility for both housekeeping and the work project at this camp was assumed by the Government. Two other government-operated camps, namely, Civilian Public Service Camp No. 128 at the Deschutes Reclamation project (Oregon), and Civilian Public Service Camp No. 135 at the Seney National Wildlife Refuge (Michigan), were placed in operation during the year.

All camps on Department of the Interior lands, of which there was a total of 11 at the close of the year, continued to give first priority to the protection and conservation of natural resources, including fire, insect, and disease control.

PRISONER-OF-WAR CAMPS

On November 8, 1943, the Secretary advised the Provost Marshal General of the War Department that the Office of Land Utilization had been selected to represent the Department of the Interior with respect to all proposals pertaining to the use of prisoner-of-war labor on Department of the Interior lands.

Following the establishment of this liaison relationship a request was made to the War Department for clarification of its policy with respect to the compensation to be paid by Federal agencies for prisoner-of-war labor. As a direct result of this request the War Department issued instructions which provided that the sponsoring Federal agency reimburse the War Department for the aggregate cost of prisoner-of-war labor at the rate of 80 cents per day for wages and approximately 65 cents per day for subsistence.

As of June 30, 1944, only one contract had been consummated with the War Department by an agency of this Department, namely, the Fish and Wildlife Service. However, it is expected that this source of labor may prove helpful in relieving shortages which have developed in connection with slash disposal on Indian reservations and in the construction of access roads.

Grazing Service

C. L. FORSLING, Director



THE IMPORTANCE in war of land, minerals, food, fibre, and other materials derived from the soil has been emphasized throughout the fiscal year. To help mobilize these resources on grazing district lands so they may be utilized to the full extent in the war program has been foremost in the work of the Grazing Service. Many of its peacetime "musts" have been postponed until victory is won.

The Federal range is extensively used in many ways for the training of men and the development of machines and skills for war. Practice bombing ranges, flying schools, mine roads, supply dumps, and many other similar activities and uses tell the story of the part these lands are playing in the war program.

Range Administration.—In the 10 years since the passage of the Taylor Grazing Act progress has been made in the accomplishment of the proper use of the grazing district range. This has made it possible for these lands better to play their part in the production of livestock for war needs. Regulation of the range has eliminated the migrant herds which formerly menaced the stability of the local livestock industry. The consumption of vast quantities of forage by horses that are no longer useful as domestic animals has been greatly reduced, and the reduction in overstocking coupled with better seasonal use affords better growth of forage.

Most effective of all perhaps has been the stabilization in the use of the range by the dependent livestock operators and the elimination of ruthless competition. Those who are entitled to use the range now have reasonable assurance that they will have the benefit of the available forage and may plan their livestock operations with greater certainty.

In spite of these accomplishments, however, numerous jobs remain undone. Many areas need closer determination of grazing capacity and the application of better management practices in order to restore

the productivity of the range which was dissipated through the long period of unregulated use. The complicated land ownership pattern which developed prior to the establishment of the grazing districts calls for the development and execution of land exchanges whereby private, State, and railroad land is exchanged for Federal range and the exchange of use of land to simplify range administration to the advantage both of the Government and the range users. Vast areas need to be reseeded. Many improvements such as watering places, drift and division fences, and other facilities should be constructed to afford better management and more even utilization of the grazing resources. Protection from fire is still inadequate. Rodent control, to reduce the waste of range feed, needs to be expanded. These are jobs to be undertaken as soon as enough manpower and enough facilities are available.

It is the wartime policy of the Grazing Service to assist and encourage stockmen in every way possible, consistent with long-time policies, to produce more meat, wool, and other livestock products to meet the needs of war. It includes the following general principles: (1) increased use of Federal range wherever possible and consistent with good range management; (2) removal of surplus horses and the harvest of surplus game and their diversion to food channels; (3) increased protection to reduce the loss of forage and damage to the productive capacity of the soil by fire; (4) the adoption of practices and emergency activities, such as opening snow-blocked trails, to reduce livestock losses; (5) better management of both range and livestock.

Increased range use was attained by allowing extended grazing periods, by a system of war emergency licenses and by the trend of the industry toward more cattle and fewer sheep. During the fiscal year, 1,497 war emergency licenses were issued for 70,319 cattle, 993 horses, 145,700 sheep, and 4,513 goats.

A comparison of range use during the years 1940 to 1944 (using 1940 as 100 percent) shows that the number of animals licensed and permitted have been increased by 6 percent in the 5-year period and the total amount of range use permitted has been increased by 15 percent.

Whether this increased use is consistent with the sustained yield and further increase in productive capacity of the range is a matter for immediate consideration after the close of the war. The extra use has been permitted as a temporary war-emergency measure and must be curtailed wherever necessary as soon as the emergency has passed.

Action under the Secretary's orders of March 16, 1943, and January 29, 1944, resulted in the removal of 32,920 surplus horses from grazing districts, an increase of 7,647 over the number removed in 1943. A total of 77,163 horses have been taken from the Federal range and adjacent territory during the past 2 years. These have been diverted

to many useful purposes. At the same time, thousands of acres of range formerly used by these horses have become available for cattle, sheep, and wildlife.

Despite an increased harvest of big game in grazing districts, the numbers increased by about 30,000 over the previous year. Cooperative game counts in sample areas and inventories gathered from many sources indicate that approximately 535,000 big game animals inhabit grazing districts during a part or all of the year.

Licenses and permits.—The number of licensed operators increased from 22,019 to 22,562, a gain of 543, and involved 10,694,305 livestock, by classes as follows: cattle, 1,990,272; horses, 127,701; sheep, 8,482,387; goats, 93,956. The statistical detail is shown by regions on table I at the end of the chapter.

The trend toward more cattle and fewer sheep in grazing districts followed the national wartime pattern. In the 5-year period (1940–44) cattle numbers licensed have increased 27 percent and sheep have decreased 16 percent. Sixty-four percent of the range operators were on a term permit basis at the close of the year.

Criticisms from many quarters calling attention to illegal use of the range are supported by records which show a greater number of trespass cases during 1944 than for any previous year. Current high prices for livestock, coupled with the extra grazing load and inadequate facilities for complete range supervision have encouraged trespass. This circumstance is in need of correction and can be met if and when additional personnel is provided.

Range surveys and utilization checks.—Range surveys were completed on 738,630 acres and grazing capacity estimates rechecked on 6,281,565 acres during the year. The area covered by original range surveys (598,463 acres) was the smallest coverage since the inception of this type of work in 1936. To date 114,326,240 acres have been covered by range surveys in 10 States. Since the pattern of grazing use as well as of land ownership is interwoven with Federal, State, and private lands, such surveys include a comprehensive examination of all the lands involved. Approximately 100 million acres to be surveyed in grazing districts are included in plans for post-war work, as it is anticipated that our trained personnel, many of whom are now serving in the armed forces, will again be available.

Appeals and hearings.—During the fiscal year, 142 appeals from administrative decisions were filed, an all-time low. Of these, 67 were disposed of and 75 were pending at the close of the year. Twenty of the cases disposed of were settled without formal hearing. Ten decisions of examiners were appealed to the Secretary.

Land activities.—For the third successive year primary emphasis in grazing district land matters was given to military needs. During the fiscal year 1944, 1,357,000 acres were eliminated from grazing districts

for war purposes and 11,676,000 acres were involved in military use permits. These include bombing ranges, gunnery ranges, precision bombing sites, airfields, storage dumps, depot installations, chemical warfare proving grounds, troop maneuver areas, rights-of-way for telephone lines, water pipe lines, and military roads. The livestock producers cooperated to the fullest extent in adjusting their range affairs in order that military requirements could be met.

Certain land uses for military purposes became unnecessary during the year. Also, certain military programs demanded only temporary occupancy of public lands for training purposes and, having served the purposes for which they were withdrawn, they were restored to grazing use. During the year, 1,351,000 acres of such lands were returned to Grazing Service Administration.

As of June 1944, 24,168,532 acres of grazing district lands in nine States were used for military purposes, of which 14,428,919 acres are federally owned.

There are a number of reasons why these lands are selected for military uses despite their importance for food production. Among these are: (1) their relatively low cost to the Government, (2) distance from population and industrial centers, and (3) favorable climate and topography for large-scale training operations.

Military agencies were assisted by the Grazing Service in the joint examination of areas proposed for withdrawal, special use, and alternate use. Maps, data, and technical assistance were furnished in connection with the appraisal of ranch and range areas to establish equitable settlement values under the act of July 9, 1942 (Public, No. 663, 77th Cong.). Advice and liaison were provided the Army Claims Board and enabled it to settle more promptly for alleged damages to private property in connection with troop maneuvers.

Prior cooperative agreements with bureaus in the Department were continued and new agreements for further cooperation on mutual problems were initiated. Close cooperation in these and related activities helped to maintain balanced livestock activities in the regions while affording both grazing and military uses of a number of important range areas.

Careful study was given to post-war uses of lands now devoted to military operation. Substantially all of these lands will be restored to grazing administration when they have fulfilled their present purposes. As a result of these uses and the various types of installations considerable repair is anticipated not only of the land itself but also of the livestock facilities.

Under the act of June 5, 1942 (Public, 586, 77th Cong.), the Grazing Service reported favorably on a number of applications to purchase timber growing on the Federal range, when the investigation showed that the lumber was to be used in connection with production of equipment for war.

At the beginning of the fiscal year, 209 applications were pending in the Grazing Service, involving rights-of-way, entry, exchange, and sale under sections 6, 7, 8, and 14 of the Taylor Grazing Act and the 5-acre law of June 1, 1938. Seven hundred and thirty-two such cases were received during the year, and 747 were disposed of, leaving a total of 283 pending at the close of the year. Favorable action was taken on 8 motion-picture permits, 72 cases involving disposal of improvement on canceled homesteads, and 564 applications for domestic use of timber within grazing districts.

Since actions on land matters having to do with war needs took precedence, full progress on earlier plans for consolidation of the federally owned land by the exchanges for private, State, and county land and by additional leases under the Pierce Act was retarded in some regions. Detailed, long-time plans to fit into range development and post-war activities were under way in 10 districts, involving approximately 40,000,000 acres in 10 States. These were in the process of preparation in written form at the close of the year.

Status of grazing districts.—Orders were issued establishing 2 additional grazing districts during the year, bringing the total to 60 in 10 States. Data and other essential material were assembled looking to the establishment of other districts or the addition to established districts in 3 States. Status changes during the year included, in addition to military withdrawals, 36 orders vacating former reclamation withdrawals, totaling 550,000 acres; revocation of stock driveway withdrawals involving 720,000 acres; and allocation of 50,600 acres for development under the Department's reclamation program. Grazing district acreages are shown by regions on table II at the end of the chapter.

Funds.—Congress provided \$1,070,700 for the operation of grazing districts during the fiscal year 1944. Of this amount \$978,700 was for over-all administration, including presuppression of range fires; \$83,000 for construction and maintenance of range improvements; and \$9,000 for leasing of lands under the Pierce Act. Contributed funds and allotments for soil and moisture conservation work, for fire suppression, and for miscellaneous items totaled \$912,283.55. The Public Roads Administration transferred to the Grazing Service \$1,446,500 for construction of access roads under the Defense Highway Act, as amended.

Grazing fees.—Earned grazing fees in the grazing districts totaled \$813,351.96. Of this amount \$406,584.32 was paid to the States affected and \$183.43 was deposited to the credit of Indians under provisions of the Taylor Grazing Act. State revenues derived from grazing fees during the 9-year period, 1936 to 1944, now total \$3,062,047.34. Moneys paid to States as a result of grazing fees earned in the fiscal year 1944 are as follows: Arizona, \$18,484.26; California, \$10,087.20; Colorado, \$27,056.36; Idaho, \$37,321.96; Montana, \$28,-

515.37; New Mexico, \$60,337.92; Nevada, \$65,051.35; Oregon, \$26,980.31; Utah, \$74,063.15; Wyoming, \$58,686.14. The flat rate of 5 cents per month per head for cattle and 1 cent per month for sheep over 6 months of age, with some exceptions, continued to be charged as the grazing fee in grazing districts. The authorizing act provides for "the payment annually of reasonable fees in each case to be fixed or determined from time to time." The task of determining a "reasonable fee" for the wide variety of conditions found on the public range in 10 Western States is not a simple one. The fact finding and analysis necessary to its accomplishment were interrupted on the entry of our country in the war by other activities incident to meeting war needs. This undertaking cannot be delayed much longer.

Audits.—Audits were completed in 6 of the 10 regions during the year. It was impossible to keep current this important phase of the work due to the shortage of personnel qualified to handle these matters.

Job load analyses.—Analysis of work load in the grazing districts, begun 2 years ago, was completed during the fiscal year just closed. The data were assembled and a method of rating the districts on the basis of minimum personnel needs was developed. They emphasize the excessive overtime of present personnel and that many jobs are being slighted because of inadequate manpower.

Training and personnel.—The high percentage of personnel turnover, particularly clerical, has made on-the-job training a daily requisite. In the conduct of action programs and to meet changing conditions incident to war demands, conferences were held at all levels in the national, regional, and district offices as often as time and funds would permit.

Temporary wage employees decreased 36 percent and salaried workers increased 10 percent during the year. The number of employees in military service totaled 173 at the end of the year, an increase of 39.

Equipment and supply.—The state of repairs of power machinery and automotive equipment needed to prosecute action programs is at a low ebb and great difficulty was experienced during the latter part of the fiscal year in obtaining competent repair of units. Maintenance costs of old, worn-out units have been excessive.

Range development.—To conserve manpower and material, primary consideration has been given to maintenance work on existing range improvements for the duration. Approximately \$150,000 was expended during the year for this purpose. However, in addition to public funds the ranchers in many localities contributed an unrecorded amount of labor in maintaining thousands of small projects of various types, mainly springs, wells, reservoirs, corrals, and fences. Whenever new construction was undertaken during the year the matter was first considered on its merits. That is, whether it would pro-

mote beneficial use of the range, add to food supplies, and aid producers to overcome critical labor shortages. In this light a considerable number of fencing and water development projects were pushed to completion. On one-half of all the range-improvement projects completed during the year, stockmen furnished either the labor or the material or both. Despite the handicaps occasioned by shortage of parts, the facilities such as windmills, pumps, and other installations at principal stock-watering places were maintained in serviceable condition. This was accomplished by use of salvaged equipment and substitutes in certain instances. A summary of range improvement projects completed is shown on table III at the end of the chapter.

Under section 4 of the Taylor Grazing Act fences, wells, and other facilities for handling of permitted livestock on the range may be constructed and maintained by the range users. A total of 432 permits to construct and maintain such improvements and 92 permits to maintain existing facilities were issued during the year. These have an estimated value of \$332,572.50, an item of expense that is borne by the range users themselves.

Soil-and-moisture conservation.—Soil-and-moisture conservation work to restore depleted range lands was conducted during the year on 60 of the 95 project areas approved by the Office of Land Utilization. Gully plugging and area treatment to arrest wind and water erosion and fencing to prevent misuse of treated areas comprised the principal class of activity in this connection. Since the rehabilitation of ranges is integrated with activities authorized by the Taylor Grazing Act, the soil and moisture conservation work was augmented by contributions from the range improvement funds and by donations from cooperating individuals and groups.

Range protection.—Range fires consume large quantities of resources needed for victory. They draw manpower from important work, aid the Axis, and prolong the war. Everything possible is done to keep such fires down to an absolute minimum.

Due to a late spring in 1944 fire occurrence during the latter half of the fiscal year was only about 50 percent of expectations. Throughout the past year weather conditions were more favorable from a fire-hazard standpoint than for many years. Encouraging results from training and organization for fire suppression are shown by a reduction in both number of fires and acreage burned.

A burn of three-quarters of a million acres is too great a loss, however, considering in addition to the value of the forage destroyed the interruption of going livestock operations, the damage to the productive capacity of the range, and the soil erosion and watershed menace thus created.

In training and educational programs emphasis is given to fire prevention. During the year, 86 training meetings for per diem guards and 114 meetings for training under the Forest Fire Fighters Service Cooperative System were held in grazing districts. At these schools a total of 3,419 men received instruction in techniques. In addition, 1,373 cooperative fire fighters, mostly farmers and stockmen, were given spot training in fire fighting methods and prevention. Since almost 80 percent of the fires that occur on the Federal range are man-caused the protective measures include constant educational campaigns. As a result of these cooperative efforts, which were aided by favorable weather conditions, the 1,085 fires last year burned 748,138 acres as compared to 1,128 fires which burned 1,734,992 acres the previous year.

Drafting.—During the year the drafting facilities of the Grazing Service continued to serve the Army and other war agencies at the expense of much needed regular work. About 60 percent of the volume was for various branches of the Army and included blueprints, photostats, tracings, drawings, and drafting of air bases, buildings, installations, supply depots, land status plats, etc. At the peak of Army demands for this type of work, the Grazing Service recruited, trained, and supervised certain temporary employees attached to the War Department pay roll.

Access roads.—One of the outstanding Grazing Service contributions to the war program is the construction of access roads to sources of raw materials. From the inception of the access road program in 1942, 1,570 miles of such roads have been built to 20 types of metals, minerals, and other war materials in 8 States. During the fiscal year 788 miles were completed at a cost of \$1,171,293. As a part of the Department's war program, the building of these roads has stimulated the small, independent operator to rush his diggings, and the emphasis on production of these vital materials has shifted with the progress of the war. For instance, in the early days of war production great shortages existed in the steel alloy materials. The road program then was directed to deposits of vanadium, chromium, manganese, and tungsten. Later the needs for coal, timber, petroleum, and certain non-metallic minerals shifted the emphasis to such products. There are many rungs in a ladder which reaches from the bottom of a mine shaft to a battle front, and an access road is one of them. Over such roads go truck loads of mica, gilsonite, manganese, vanadium, lead, zinc, coal, and many other basic ingredients of tanks, planes, guns, explosives, and precision instruments.

Post-war plans.—During the year the Grazing Service submitted to the Department general plans for a much needed post-war range-improvement program, which would employ 31,000 men for a 3-year

period at an estimated cost of \$226,000,000. This involves 60,000 projects of 16 major types, widely distributed in 60 grazing districts, and can be implemented within 3 months after victory. The plan contemplates 150 camps of 100-man capacity as well as the employment of 7,500 men on work convenient to their homes. Of the total expenditures contemplated in this program nearly \$200,000,000 would be for wages in 200 counties. Already 5 percent of the listed projects have been approved as to location and type of structure. To expedite the program in the event of an unemployment problem after the war, funds are needed now to provide the necessary detailed surveys, specifications, and plans for launching the program promptly at the proper time. In accordance with the President's request of May 23, 1943, and supplemental Department instructions, the Grazing Service submitted in August 1943 an estimate showing the need for \$3,000,000 to cover detailed engineering and planning costs of its post-war program.

TABLE I.—Number of licensed operators and livestock in grazing districts by regions, June 30, 1944

Region	Licensed operators	Cattle	Horses	Sheep	Goats	Total livestock
Arizona.....	612	98,062	2,253	140,558	11,145	252,018
Colorado.....	2,150	187,506	7,332	746,320	152	941,310
Idaho.....	3,355	214,394	17,440	1,237,313	85	1,469,182
Montana.....	3,200	223,772	25,583	1,080,040	57	1,329,452
Nevada-California.....	1,690	394,186	17,051	960,999	3,084	1,375,320
New Mexico.....	2,828	293,034	12,483	678,066	47,449	1,031,032
New Mexico, 7.....	1,935	5,405	7,424	140,705	22,834	176,368
Oregon.....	1,473	231,238	16,883	373,084	-----	621,205
Utah.....	3,809	178,810	8,087	1,520,629	8,950	1,716,476
Wyoming.....	1,510	163,865	13,165	1,604,662	250	1,781,942
Total.....	22,562	1,990,272	127,701	8,482,376	93,956	10,694,305

TABLE II.—Status of grazing districts—approximate acreages of Federal land as of June 30, 1944

State	Number of districts	Gross area	Withdrawn by establishment of grazing districts	Other Federal land	Total Federal land administered by the Grazing Service	Other land ¹
Arizona.....	4	18,171,400	8,847,274	819,879	9,667,153	8,504,247
California.....	2	8,050,300	2,584,237	812,399	3,396,636 ²	4,653,664
Colorado.....	8	15,903,700	7,645,973	654,561	8,300,534	7,603,166
Idaho.....	5	21,867,600	12,326,501	782,200	13,088,701	8,778,899
Montana.....	6	31,968,700	5,781,597	924,357	6,705,954	25,262,746
Nevada.....	5	48,590,200	33,586,969	549,700	34,136,660	14,423,531
New Mexico.....	7	39,747,400	14,263,675	684,369	14,948,044	24,799,356
Oregon.....	7	20,346,500	12,400,385	157,763	12,556,148	7,788,352
Utah.....	11	37,487,800	21,343,546	2,155,525	23,499,071	13,988,729
Wyoming.....	5	22,506,100	13,500,878	1,096,329	14,597,207	7,908,893
Total.....	60	264,609,700	132,281,035	8,617,082	140,896,117	123,711,583

¹ Includes State, private, county, and certain withdrawn lands which the Grazing Service does not administer.

² In addition, the Grazing Service administers 1,306,885 acres of non-Federal land within grazing districts in 6 States under leases authorized by the Pierce Act of June 23, 1938, and under cooperative agreements with the owners.

TABLE III.—*Cumulative summary of range improvement projects*

Type of project	Unit	Completed, fiscal year 1944	Total com- pleted or ac- quired from April 1935 to June 30, 1944
STRUCTURES			
Spring developments.....	Number.....	110	1 1,952
Reservoirs (stock water).....	Number.....	313	1 2,882
Wells (stock water).....	Number.....	89	1 787
Pipe and tile lines.....	Lineal feet.....	17,510	1 318,690
Ditches.....	Miles.....	4.5	57.7
Truck trails.....	Miles.....	244	1 13,905
Stock trails and driveways.....	Miles.....	66	1 3,171
Bridges (over 20-foot span).....	Number.....	12	196
Fences.....	Miles.....	345.2	1 6,479
Corrals and holding traps.....	Number.....	41	1 402
Cattle guards.....	Number.....	66	652
Dipping vats.....	Number.....	1	5
Firebreaks.....	Miles.....	870	3,683
Telephone lines.....	Miles.....	4.5	286
AREA TREATMENT			
Rodent control.....	Acres.....	276,716	-----
Insect pest control.....	Acres.....	2,700	-----
Range revegetation (seeding).....	Acres.....	41,083	-----
Noxious weed eradication.....	Acres.....	788	-----

¹ The total number of completed projects as reported for the period 1935 to June 30, 1944, includes projects acquired, such as drought relief and other emergency structures which are now recorded as grazing district improvements.

Fish and Wildlife Service

IRA N. GABRIELSON, Director



THIS Service is the Federal custodian of the Nation's vast fish and wildlife resources, and in cooperation with the various State and Federal agencies, organizations, and individuals has the responsibility to see that this valuable natural asset is fully maintained and wisely managed.

America's predominant position in the commercial fishing industry of the world must be maintained. Post-war competition among nations for the food resources of the high seas and even of coastal and the larger inland waters will be greatly intensified. That the resources may be utilized in accordance with sound principles of conservation and management the Service is helping the commercial fishery industries to organize for expansion and is acquainting them with the most modern technological and scientific methods.

At the present time fishery products rank fifth among food resources of the Nation, and in addition supply vitamins, oils, fish meal for livestock and poultry foods, and byproducts for industrial uses. If the fishery industries are to maintain a constant flow of these materials essential to our economy, and if they are to realize in the near future the potential 7-billion-pound yield of fishery products a year, governmental assistance will be necessary in the form of scientific direction. The providing of facilities for technological engineering and scientific improvement of fishing and of processing, distributing, and marketing fishery products is well adapted to a post-war program of public works. Such facilities will include experimental stations and research laboratories, vessels for the development and exploration of fishing grounds, and fact-finding surveys to provide comprehensive inventories of the status of the industry.

Hunting, fishing, and recreation play such an important part in the life of the American people that planning and construction projects designed to perpetuate the wildlife resources are being given a prominent place in post-war planning.

A 3-year development program for wildlife conservation has been outlined. Work plans are now available for the employment of some 12,000 persons. In addition it is estimated as a result of these projects that another 4,000 persons will receive employment from private industry in the production of materials, supplies, and equipment. Additional programs are being formulated that will provide at least 8,000 persons with employment in development operations and 1,500 persons with employment in private industry. This 3-year program for the continuation of wildlife development projects will cost approximately \$115,000,000.

The Fish and Wildlife Service program for the protection, development, and utilization of fish and wildlife resources involves a wide variety of activities. The more important of these are: Construction and development of wildlife refuges, fish hatcheries, and rearing ponds; stream and lake improvement; tree planting on refuges; range revegetation; marsh conditioning; and other management practices including controlled burning, as well as prevention and suppression of uncontrolled fires—all designed to improve living conditions for wildlife.

ECONOMIC FISHERY INVESTIGATIONS AND PROGRAMS

Studies in fishery economics have been completely adjusted to war needs. For the first time data have been collected from fishery unions on membership and movements. Tables have been established which indicate the classification of labor in the fishery industries according to sex, age groups, and occupations. Occupation titles and definitions also have been studied. The material was successfully used in presenting to the War Manpower Commission and the Selective Service System the case for adequate recognition of the needs and importance of the fishery industries.

These labor studies will be the bases for analyses of post-war labor problems which will extend especially to wages and hours, to collective bargaining, and to the seasonal character of fishery labor. It is planned to establish a labor unit for the specific purpose of collecting data and studying the problems involved. This will contribute indirectly to reemployment after the war and to the solution of the fishery industries' social security requirements which up to now have not received adequate consideration in Federal and State legislation.

A survey of the financial condition of fishery cooperatives was made for a report to the Ways and Means Committee of the House of Representatives on a bill which provides for the exemption of cooperatives from certain taxes. The material collected will be the basis for future studies on cooperatives, a type of fishermen's association which will be of increasing importance in the post-war period.

A survey made in 12 cities during January and February for the purpose of determining the effect of Office of Price Administration's retail Maximum Price Regulation 507 on the retail price and consumption of fresh fish indicated that the regulation was beneficial as it made available to a large number of consumers an increased poundage of fish at lower prices. To prevent disruption of the usual channels of production and distribution, a survey of 1942 fresh-fish prices was outlined, conducted, and supervised in cooperation with Office of Price Administration in order to find a fair and equitable basis for fish prices at production and wholesale levels. The same consideration prevailed in an extended study of cost increases in the fishery industries from 1941 to 1943 and to prevent an eventual unadjusted recession of prices to pre-war levels. The cost survey will establish samples of cost ratios for normal and for war years to which any individual enterprise can compare its own costs and profits. Both the price and cost surveys will be continued, the results being important to the solution of post-war problems.

CONSUMER RELATIONS

Efforts made during the fiscal year to obtain maximum benefit for consumers have led to wider dissemination of fishery facts and to the marketing of new and little used varieties of fishes. Although these programs develop slowly there is every reason to expect that their war impetus will be effective in promoting increased fish consumption to a considerable degree in the post-war period.

COLLECTION AND PUBLICATION OF FISHERY STATISTICS

The collection and publication of information relating to the quantity and value of the commercial catch of fishery products in the United States, the employment of fishermen, shore workers, fishing craft and gear in the industry, and the production of manufactured fishery products was continued. Due to the loss of agents to the armed services and also through the assignment of members of the statistical staff to assemble information required by war planning and regulatory agencies, it was necessary to curtail the regular statistical surveys. However, the collection and publication of certain additional current information required by the industry and Federal agencies concerned with the fisheries was undertaken.

FISHERY MARKET NEWS SERVICE

This service assists the orderly marketing of fresh, frozen, and cured fishery products by disseminating to fishermen, shippers, wholesalers, buyers, and consumers, current information on production, shipments, prices, supply, and demand. Field officers at New York, Boston, Chi-

cago, Seattle, and New Orleans, issued daily and monthly reports during the entire fiscal year, but the Jacksonville office was closed after only 2 months' operation, due to curtailment of funds. In addition to the supply and demand data in the daily reports and monthly summaries, the market reports reprinted all Federal orders, in full or in condensed form, which affected fishery production, marketing, or supply. The inclusion of these regulations, immediately upon issuance, provided the only current source of such information to the fishery industries.

Fishery Market News, a monthly review, also carried special articles of interest to the industry, more complete texts and interpretations of Federal orders, and a monthly index of Federal regulations. Market News data has been extensively utilized by other Federal agencies to determine ceiling prices on fishery products, in transportation studies, in allocating catches, and in distribution surveys. The demand for these data and the need for expanding and adapting Market News procedures to meet war requirements is expected to continue in the post-war period when production and distribution problems, though different, will be equally acute. To meet these demands, additional Market News offices will be required to collect data for those sections of the country from which current information on production, imports, markets, and distribution is not now being received.

STUDIES TO IMPROVE METHODS OF PRODUCTION AND USE OF FISH

The fishery technological laboratories at Seattle, Wash.; College Park, Md.; Ketchikan, Alaska; and Mayaguez, P. R., continued to be completely occupied with researches aimed to relieve difficulties caused by material and manpower shortages that have handicapped the fishery industries. Such difficulties may exist for a considerable time in the post-war period, particularly if large quantities of fishery products are required for export. Current technological advances therefore, will have continuing and world-wide application.

Specially prepared packs of all types of fish and shellfish, both fresh and processed, were subjected to storage and shipping tests to determine the most practical solution to the critical tin shortage. After many field and laboratory tests, recommendations were made for the most effective use of available fibers for cordage and nets. Chemical and bacteriological studies resulted in improved methods for extracting agar and related seaweed gums. Investigations of present and possible vitamin-A resources provided information for their intelligent exploitation. Improved methods of handling and processing fish livers also were developed.

To increase the Nation's food supply, the laboratories developed new canned fish products and demonstrated the utility of numerous kinds of fish and shellfish formerly neglected. In order to increase the utili-

zation of fish as food, improved handling and processing methods and new recipes were evolved.

Upon its request, the Army Quartermaster Subsistence Laboratory was furnished technical assistance in solving fishery problems by the detail of an experienced fishery technologist.

On the basis of completed and proposed researches, the laboratory staffs are prepared to make recommendations which will enable the fishery industries to satisfy the expected demands of post-war markets for improved methods, equipment, and products.

THE ROLE OF GAME FISH AND HATCHERIES

Since the outbreak of hostilities, the general public has realized more than ever before the tremendous value of this country's fishery resources. While at the present time first place must be assigned to the amount of nutritious food involved, the recreational value of angling is of utmost importance under the stress of wartime living. Continued maximum use of the fishery resources cannot be attained by a static policy of merely guarding them against unwise utilization. Therefore, the Division of Game Fish and Hatcheries has realigned its program to include management principles. Up to a short time ago the Division had been concerned largely with producing hatchery stock—the raw material of fisheries management. While for various reasons it will not be possible to put this revised program into full operation until the post-war era, the foundation is being laid as rapidly as manpower will permit.

During the present emergency, the value of a properly constructed and managed farm pond has been fully demonstrated. Such ponds are producing thousands of pounds of edible fish annually, but owing to restrictions upon the heavy equipment required for constructing the impoundments, the program has not reached its peak. When conditions return to normal, it is anticipated that in some States 45 percent of all farms will have one or more ponds. The Division of Game Fish and Hatcheries is expanding its studies on the stocking and managing of farm ponds for the purpose of obtaining more fundamental information so that greater yields may be derived from the ponds that are developed in the future.

BIOLOGICAL INVESTIGATIONS OF THE FISHERIES

The very nature of biological control of the fisheries and the necessity for keeping in mind future goals as a guide for current action has stimulated careful thought on plans to be consummated after the war. Restriction of theoretical studies was continued as more men than during last year were detailed to the staff of the Coordinator of Fisheries. Unpredicted changes have occurred in the fisheries of the Nation, changes the significance and magnitude of which must

be noted now so that their bearing upon the future management will not be forgotten.

As usual the work was conducted on a regional basis. In the North Atlantic area studies related especially to the rosefish and yellowtail flounder, the yield of which will decrease considerably unless practical remedial measures can be developed. On the other hand, fishing pressure on both the haddock and lobster populations has been reduced considerably as the result of wartime boat and manpower shortages. Observations on their recovery will be of aid in maintaining and increasing the yield in post-war years.

In the Middle Atlantic area studies of the shad fisheries indicate that all the major producing streams can be restored to full production by the abatement of pollution, in some cases, and by provisions for a larger spawning reserve in others.

Investigations in Alaska were directed toward maintaining maximum production of the fisheries and toward collecting data for their proper management in the post-war period. These were concerned particularly with the salmon populations of Bristol Bay, Brooks Lake, and Karluk River. The commercial catch of pink salmon in southeastern Alaska was disappointing with a total production of 1,035,000 cases, only a fourth of the 1941 yield. Studies carried out at the Little Port Walter Station indicated an unfavorable change in returns in the "test stream" at this location. Herring production in Alaska showed a substantial increase with a total yield of 84 million pounds as against 38 million pounds for 1942. Predictions of the age-composition and probable abundance of herrings were made for the season of 1944, from which it appears that the prospects of this fishery are very good.

The sablefish industry has expanded rapidly under wartime demands, the commercial catch of the past season amounting to approximately 4 million pounds. A survey was undertaken to appraise the probable effect of this increased fishing intensity and to determine the need for regulation. This species has been accepted as an excellent food fish and it is probable that there will continue to be a considerable demand for it after the war.

In South Atlantic and Gulf areas observations on the effects of war conditions on our shrimp fisheries have been continued. This information will be of great value in the formulation of principles for future management. Close watch and collection of data on the fast-expanding offshore shrimp fishery have been maintained as developments there will be important in the future of the industry.

Research on the pilchard fishery of our southern Pacific coast is directed toward learning the size and productivity of the resources and toward measuring the response of these quantities to different levels of fishing intensity. Results achieved during the past year have demonstrated that fluctuations in year-class strength are highly

correlated with fertility of the sea, as reflected by surface salinity. The abundance of the resource was found to be indicated, to a high degree, by the size of the two age classes which ordinarily dominate in the California fishery and by the amount of fishing effort 3 years previous to each season. With the return of post-war facilities, considerable benefits may be expected to accrue to the industry from the increased understanding of the trends and fluctuations in the pilchard fishery.

In the Great Lakes area, exhaustive studies are needed on the lake trout, the most valuable of the Great Lakes commercial species. It is especially urgent that the relative effectiveness of artificial and natural propagation of the species be investigated.

Analysis of conditions, which in the past have been impeding the progress of the shellfish industry, shows that depletion of natural oyster grounds and pollution of inshore waters are the two principal factors responsible for decline in the production of oysters and clams, and that introduction of a definite State-management plan of exploitation is necessary for the rehabilitation and planned utilization of these natural resources.

The rapid development of many new industrial processes, and sanitary engineering procedures, attendant on the war have created water-quality problems which will persist to the serious detriment of the proper post-war development of national fisheries unless adequately controlled. Accordingly, systematic studies of these new effluents and other substances which can affect our aquatic resources detrimentally have been made or are in progress to provide specific scientific definitions of the hazards which these materials present to fish and other aquatic life.

After determining the noxious fractions of the various wastes and effluents, attention has been given to the chemical and physical properties of these fractions looking toward their transformation into innocuous or useful products. Practical approaches for the elimination of harmful effluents by utilization have been suggested to the managers of several plants and are now in successful operation. This work has increasingly demonstrated that practically all industrial pollution is not only unnecessary, but that in many instances commercially feasible processes of utilization can be developed which will pay part or all of the elimination expenses and may even show a profit.

War conditions have closed several plants that formerly poured large quantities of destructive wastes into certain streams and it has been possible to observe the return of these streams to normal fish productivity after cessation of the industrial pollution. These findings show that following the elimination of industrial pollution many streams will return rapidly to valuable fish production. It has

been found that very dilute pollutants present in quantities much too small to be directly harmful to fishes may, nevertheless, in time completely eliminate all fishes from the polluted waters.

PROTECTION OF THE ALASKA FISHERIES

Protection of the fisheries of Alaska has continued with the purpose of permitting maximum commercial utilization of the resource consistent with a stabilized yield on a high level of productivity in perpetuity. Every question raised with regard to promulgation or adjustment of regulations has been answered in favor of conservation as against exploitation.

The need for greater production of food fishes, during the war years and in the post-war period, has not gone unrecognized, however. Increased emphasis has been placed on careful observations of fishery runs; regulations have been made more flexible to permit announcements of seasonal extensions when runs are above expectations; as a result, in 1943, 119 additional fishing days were permitted, and catch limitations on herring were raised 6,250,000 pounds. An increase of 36,536,405 pounds of fishery products over 1942 production was realized, of which 24,032,224 pounds represented the increase in the output of canned salmon.

FUR-SEAL INDUSTRY

The year ending June 30, 1944, was notable in that the take of 117,164 fur-seal skins on the Pribilof Islands was the largest number ever secured under controlled conditions. The largest previous annual take was 110,585 skins in 1874. The byproducts plant produced 782,000 pounds of seal meal marketed primarily for stock and poultry feed, and 75,259 gallons of seal oil sold for leather-tanning processes.

In May 1944, the natives of the Pribilof Islands, together with supervisory personnel, were returned from Funter Bay in Southeastern Alaska, to the Pribilofs from which they were evacuated for security reasons in June 1942. This will reestablish sealing and foxing activities on a normal basis, and permit the expansion of the present byproducts plant, for which funds have been appropriated, to utilize all seal carcasses on St. Paul Island.

During the fiscal year 1944, two public auction sales of fur-seal skins were held at St. Louis, Mo., for the account of the Government. On November 1, 1943, 17,525 dressed, dyed, and finished skins sold for \$717,147.40 and on June 19, 1944, 21,742 skins were sold for \$795,397. Also, 3 confiscated skins were sold for \$1.50. In the same period, 230 skins were sold at private sales for promotional purposes, under special authorization of the Secretary for \$11,165. Total gross sales during the year amounted to \$1,523,710.90.

Of particular interest to conservationists was the act of February 26, 1944, giving effect to a provisional fur-seal agreement entered into

with the Canadian Government in 1942, and superseding the acts of April 21, 1910 and August 24, 1912. The terms of the new law, made necessary by the abrogation of the fur-seal treaty of 1911 by Japan, 6 weeks before the outbreak of the present war, provide for continuing protection of the fur seals of the North Pacific, and for a division of the skins on the basis of 80 percent to the United States and 20 percent to Canada.

COOPERATIVE PREDATOR AND RODENT CONTROL

Predator and rodent control operations conducted on a cooperative basis with other Federal agencies, States, counties, municipalities, livestock grower and farmer organizations, and individuals played an important role in furthering food and fiber production and conservation. Sheep, cattle, and poultry were saved from destruction by coyotes and other predators and stored foodstuffs, agricultural crops and other vital materials were protected from the onslaughts of rats and field rodents.

In predator control operations 118,879 predatory animals were taken, consisting of 108,050 coyotes, 1,170 wolves, 8,900 bobcats and lynx, 167 mountain lions, and 592 stock-killing bears. Rodent control operations included the treatment of 12,336,172 acres of infested lands for the control of field rodents and the treatment of 377,499 premises to control common house rats.

The operation of the combined projects involved the expenditure of \$845,908 from Service funds, \$579,885 from cooperating States, and \$1,302,554 from cooperating counties, livestock grower and farmer associations, and others. The Service's Supply Depot at Pocatello, Idaho, prepared and distributed 647,655 pounds of rodent bait materials to cooperators and processed other supplies and equipment.

Control operations were not conducted without many difficulties inherent in wartime conditions. There was a dearth of trained predatory animal hunters and rodent control workers, and a shortage of automotive and other equipment in face of the fact that increasing predator and rodent populations demanded greater, rather than diminished, control efforts. The Service continued to cooperate with the Army and Navy on numerous military reservations in the control of rats and field rodents to protect food supplies and to alleviate the threat of rodent-borne diseases.

LOSSES REDUCED THROUGH ORGANIZED CONTROL WORK

Where predatory animal and rodent control work has been intensively prosecuted, substantial benefits have accrued.

For example, one hunter in Presidio County, Tex., held losses among 40,000 sheep and goats to 11 sheep killed by coyotes. Another hunter in the same county kept losses among 11,000 sheep down to 35 killed

during the year. Crane County, Tex., ranchers report that predator control has made possible an 80 percent, instead of a 40 percent, lamb crop.

While the foregoing examples are typical of many areas, the general predator problem is definitely more acute. This is reflected by the fact that although a yearly take of 100 predators by an individual hunter was considered excellent work a few years ago, today many hunters are destroying predators at the rate of 400 to 600 or more annually.

Previous to control work in Flathead County, Mont., the loss to wheat, oat, barley, and truck crops amounted to 3 percent annually because of ground squirrel depredations. On a monetary basis, this loss exceeded \$54,000. Organized control during the past 5 years, costing \$6,200, effected a net saving in crops of approximately \$48,600. In Ravalli County, Mont., where sugar beet, pea, and truck crops were involved, the returns from ground squirrel control were \$10 for each \$1 expended. The Mayor of Marshfield, Oreg., reports that at least \$25,000 worth of food and other merchandise has been saved during the year because of organized cooperative rat control.

POST-WAR ASPECTS

Post-war control of injurious mammals will be greatly aided by the existence of our field organization—kept going as efficiently as possible during the war—through which expansion of projects may be facilitated. Greater effort must be applied after the war to regain control of predator and rodent populations that have locally increased rapidly in numbers. The upswing of predatory animal populations began at the onset of the financial depression when low fur prices removed the incentive for private trappers to take predators for their pelt values. The situation was aggravated because at that time, when accelerated organized control effort was needed to fill the gap, Federal and cooperative appropriations for the purpose were decreased. The effects of subsequent advances in fur prices, which ordinarily would have stimulated predator control, were neutralized because private trappers began to find more remunerative employment in defense and war industries or entered the military forces. These factors have operated to remove an important check on predators, the numbers of which have continued to increase alarmingly. The manpower shortage has also served greatly to curtail organized rodent control operations and thus has permitted rodent pests to continue their upward population trends. Livestock, crop, and foodstuff damage by predators and rodents has also increased proportionately. As manpower and equipment again become available, expansion of sorely needed mammal control can be realized.

The urgency of rodent and predator control to protect vital food resources has occupied a prominent part in the thinking of more and more people during the period of war. The impression thus left will serve to stimulate cooperative measures to protect and conserve vital food resources in times of peace, which will be needed to rehabilitate our own and the war-torn nations. The widespread interest in rat control, especially stimulated during the war to curtail food loss and to protect human health, will increase in the post-war era.

WILDLIFE CONSERVATION LAWS AND REGULATIONS

Realizing that an increased demand for hunting opportunities will immediately follow the war, the Service is administering the Federal conservation laws and regulations to assure an adequate supply of wildlife at that time. These laws include the: (1) Migratory Bird Treaty Act, (2) Lacey Act, (3) Migratory Bird Conservation Act, (4) Migratory Bird Hunting Stamp Act, (5) law protecting wildlife and property on Federal refuges, (6) Black Bass Law, (7) Bald Eagle Act, and (8) the Alaska Game Law.

The 60-odd United States game management agents, working singly or in cooperation with State officers and United States deputy game wardens, obtained 1,985 convictions during the past fiscal year. With an expenditure of only \$15.75 by game management agents, 3 persons were convicted of serious violations and fined \$700. In addition, the agents worked with farmers in controlling migratory birds threatening damage to agricultural crops and detected and reported to the proper Federal authorities suspicious characters and acts inimical to the welfare of the Nation.

Importation permits issued and the number of animals and birds imported increased as the submarine menace eased. The greatest increase was in monkeys, used largely in medical research laboratories; 7,728 arrived compared to 3,675 the previous year. Mongooses are prohibited by law from entry, but 2 were brought in without permits. One was discovered in New York, the other in Philadelphia. Both were asphyxiated and their skins preserved for science.

Approximately 40 percent of the enforcement agents in the Territory of Alaska have entered the armed forces, but, by making a few replacements and by the increased use of airplanes, it was possible to obtain fairly satisfactory results. Valuable assistance was furnished the armed forces and Federal Bureau of Investigation by enforcement agents. The problems of wildlife protection in the Territory increased in proportion to the influx of men of the armed forces and war workers. The problems were largely solved by arrests, speedy convictions, and cooperation on the part of the military authorities and of project superintendents.

NATIONAL WILDLIFE REFUGES

In general, the refuges enjoyed satisfactory water conditions, the nesting season was successful, and the production of wildlife food was favorable. The refuges also contributed materially to the war program through the production of food, furs, and other essentials.

In 1943, livestock grazing to the extent of 279,358 animal months' use was provided and 15,836 tons of hay were harvested; the cultivation of 21,173 acres of refuge land by private individuals and refuge personnel produced 456,887 bushels of grain and other crops. These represent increases amounting to 177 percent for cattle grazing, 161 percent for hay production, and 182 percent for cereal crops as compared with 1940. These increases were due, first, to the fact that while most refuges were not in full production in 1940, subsequent proper management has increased utilization possibilities; and second, to operations in accordance with the Department's policy to make available in the war program all possible resources of the Department.

The restoration of drained marsh areas has served to increase substantially not only the numbers of waterfowl but also of fur animals, the pelts of which are of great value in outfitting troops in northern climates. Approximately a million fur animals have been taken on the National wildlife refuges between 1936 and 1944. During the 1943-44 trapping season, a total of 185,130 fur animals was taken or 148 percent of the 1940-41 catch.

An increased use of wood products was permitted during the year. As much pulpwood, posts, ties, firewood, and lumber was removed as practicable without adversely affecting the primary purposes of the areas.

Where circumstances permitted, refuge waters were managed for fish production. Consequently, more use was made of their fishing waters than ever before. Recreational fishing totaled 149,941 man-days and resulted in the taking of 760,511 fishes. An additional 964,432 pounds of rough fishes were removed by commercial fishermen.

The total revenue from economic uses on National wildlife refuges including the disposition of big game animals, fur animals, and surplus products was \$244,700, which was deposited in the Treasury.

The occupation of the Netherlands West Indies by the enemy stopped the importation of kapok. In the hunt for a substitute, the fully ripened seed heads of cattails appeared to be the best for use in life preservers, sleeping bags, mats, and pads. National wildlife refuges proved to be among the best sources for this cattail fluff. The 70,000-acre Mud Lake National Wildlife Refuge in northwestern Minnesota was opened to the local residents for harvesting this crop, their income from the fluff amounting to \$34,050.

The population of migratory waterfowl, estimated during the spring of 1944 as 125,350,000 birds, was probably the greatest since the early 1920's. At least a fifth of these birds was reported using the National wildlife refuges. Populations of upland game birds and animals on these areas have also increased favorably. Hunting possibilities on lands adjacent to the refuges as well as on managed hunting units have been benefited. On certain refuges, surpluses have been used for restocking public lands with low game populations.

Fire protection on the forest, grass, and marshlands of the national wildlife refuges continued a major objective. This phase of refuge administration is particularly important not only to protect refuge resources from fire but to prevent the spread of fires to adjacent forest and grazing lands. Funds amounting to \$30,000 were provided during the year under the appropriation "Fire Protection of Forests, Forest Industries, and Strategic Facilities (National Defense)" for the purchase of additional fire-fighting equipment and the employment of lookouts, patrols, and standby crews to augment fire prevention and fire suppression on nine timber-producing refuges located within 300 miles of the coasts.

Lands aggregating 1,845,000 acres were made available on 35 national wildlife refuges within the United States for Army and Navy use as bombing ranges, artillery ranges, aerial gunnery ranges, training grounds, air bases, tank maneuvering areas, docking facilities, and as sites for chemical war munition plants.

The following areas were established as national wildlife refuges during the year: Box Butte, a reservoir of 2,210 acres in Dawes County, Nebr., part of the Mirage Flats Reclamation project, for the protection of migratory waterfowl (Public Land Order, October 30, 1943); Mesilla, an area of 500 acres in Dona Ana County, N. Mex., and El Paso County, Tex., as a resting area for migratory waterfowl (Public Land Order, April 6, 1944); Monomoy, a 3,000-acre peninsula located on Cape Cod in Barnstable County, Mass., one of the finest wintering concentration areas for waterfowl along the New England Coast; Santa Ana, consisting of 1,886 acres in Hidalgo County, Tex., acquired on September 1, 1943, the best remaining habitat on the American side of the Rio Grande for the chachalaca, white-winged dove, white-fronted pigeon, and red-billed pigeon—it will provide a refuge also for black-bellied tree ducks.

LAND ACQUISITION

The Division of Land's activities have been directed to the acquisition of those new refuges and additions to old ones where the emphasis is uppermost on post-war developments. Plans have been formulated for expansion of the work immediately upon the termination of the

war. The Division, as in the preceding war years, has delegated a very substantial part of its manpower to aiding the Navy Department in land acquisition.

WILDLIFE RESEARCH

The wildlife research program has been planned and conducted on the principle that constructive vision and foresight are essential to getting needed information and in making it available for current wildlife management programs and post-war plans. In recognition that the wildlife resources of the continent will be called upon to make an important contribution to the rehabilitation of the American citizenry and soldiers, the scientific staff has been reorganized to economize on time and cost so that the utmost could be accomplished in meeting present needs and in laying a sound foundation of biological facts for post-war programs. Cooperative efforts were enlarged with other Federal, State, and local agencies. These have included public-land management agencies, as the Forest, Park, Indian, and Grazing services and those concerned with flood control, navigation, power development, and reclamation. Extensive studies have been made to develop new poison products and methods of application in rodent-control operations and to devise improved methods of using available supplies of toxic agents heretofore commonly employed but largely cut off by war conditions. Marked progress has been made in these fields and also in the use of deterrents and frightening devices through investigations by our research laboratories and through cooperation with the Office of Scientific Research and Development of the National Research Council and with Federal, State, and local health agencies, including those of the Army and the Navy.

Looking to post-war construction and development work, there is the greatest need for effective coordination among the various land-use agencies, particularly the Corps of Engineers of the United States Army, the Reclamation Service, and the Tennessee Valley Authority. Huge impoundments are being blueprinted by these agencies and plans for wildlife development on these reservations are being made at the same time with a view to increasing their productivity for wildlife. Studies have revealed in some instances that a few minor modifications in plans will provide means whereby water can be effectively controlled for maximum production of wildlife food and habitat requirements.

Work and recreation out-of-doors appeal to a great many people. This Service is receiving many requests from military personnel and veterans who are now making plans for after the war. They are interested in such vocations as hunting, fishing, trapping fur animals, raising fur animals and game in captivity, and growing rabbits for

food and fur. These enterprises require no heavy work and are admirably suited for those who prefer the out-of-doors or can do only light inside work.

Blind people in increasing numbers are finding rabbit raising both profitable and practicable, and the Library of Congress has received requests frequently for literature on the subject in braille. Permission to transcribe Conservation Bulletin 25, "Rabbit Raising," into braille in order that information on the production of domestic rabbits for food and fur may be made available to the adult blind, was requested of the Service by the Library of Congress.

A book entitled, "What is Farming?" has been prepared for the United States Armed Forces Institute and this Service has contributed material and illustrations for the chapter, "Unusual Kinds of Farming." This includes information on fur animal and game farming, rabbit raising, and fish propagation. It is written at high school level and is intended to serve as an orientation course in agriculture. The book will be used by men in the armed services who have an interest in agriculture. More intensive courses in these subjects also are being provided.

After the last war, veterans were encouraged to invest their money in get-rich-quick schemes in the production of fur animals, including rabbits. To avoid a recurrence of this evil, the Service is cooperating with the War Department and the Veterans' Administration to inform military personnel and veterans accurately in order to prevent their being exploited by unscrupulous persons. Material calling attention to the danger of exploitation by high-pressure promoters has been included in the books, *What is Farming?* and *Managing a Farm*, which will be distributed by the United States Armed Forces Institute to military personnel.

Post-war plans for rehabilitating fur farming have been discussed at numerous wartime agricultural conferences for fur farmers. This Service has taken an active part in this post-war planning and will put forth every effort to restore fur farming during the period of readjustment. This activity is an important part of our agricultural development and fits in well with conventional farming.

All the help that we can give will be provided for the returning servicemen and others who wish to engage in fur farming, rabbit raising, trapping, and all the other pursuits in the field of fur resources. Enormous demands for development of this natural asset that have been put aside during the war await satisfaction. A great effort will be made to prevent pressure groups from exploiting any individual who is desirous of rehabilitating himself through business endeavor in the wildlife field.

FEDERAL AID IN WILDLIFE RESTORATION

Despite the war and a further reduction in appropriation, the Federal Aid in Wildlife Restoration program continued to operate effectively during the year.

The cooperating States emphasized particularly the purchase of lands of little agricultural value to provide a basis for post-war development projects. The International Association of Game, Fish, and Conservation Commissioners also has urged the State fish and game departments to plan projects of a developmental nature for post-war attention. The Association was actuated to a considerable extent by the fact that on July 1, 1943, the special Federal Aid in Wildlife Restoration fund contained \$9,441,557, representing the excess of collections over appropriations since 1938. Anticipating liberal appropriation of this accumulated money during the post-war period, the States desire to have ready ample plans so that construction and other restoration measures can be started with the minimum of delay.

Wildlife, including fishlife, is an important feature of outdoor recreation which has always played a prominent part in the American way of life. It is primarily responsible for luring thousands of people outdoors to our National parks and forests, and to the fields and streams. After the present conflict, Americans will require even greater wildlife resources for public enjoyment. In addition to their value in maintaining public health by inducing recreational activities, our abundant wildlife resources normally comprise a basic source of raw materials as fur, meat, and other industrial products, and in time of war they have developed even greater value.

Office of The Coordinator of Fisheries

IRA N. GABRIELSON, Deputy Coordinator



THE United States fisheries are in a condition more nearly approaching normal than at any time since the war began. The fleet, which lost some 700 of its finest craft through requisitioning for military service, is being restored to a size comparable with its pre-war strength. Not only is the fleet nearing its normal size, but it has been kept in good repair and will soon consist of a larger proportion of new vessels than ever before. Nets of practically all kinds are available in adequate supply and shortages of the best types of cordage for marine use are being met in reasonably satisfactory fashion by substitution. On the other hand, severe shortages of manpower persist in some sections of the industry. In the field of marketing and distribution, refrigeration facilities and storage space are generally insufficient and transportation is inadequate to the demands at certain seasons and in some localities. These remaining difficulties, however, are chiefly of a kind that affect the full and efficient utilization of the catch. The basic machinery of production has been restored to good order and the condition of the fishery resource itself is sound.

The improved condition of the fishing industry is reflected in the statistics of production. The total yield in 1943 was 4 billion pounds, a substantial gain over the 3,700,000,000 pounds landed in 1942 and approximately equivalent to the catch of the pre-war year 1940, when production totaled 4,059,524,000 pounds.

The upward trend begun in 1943 has continued into 1944. Total production in the major fisheries made encouraging increases in the first 6 months of 1944 as compared with the previous year, although catches of a few important species are somewhat smaller than last year.

Especially encouraging is the gain in the New England vessel fish-

eries, which last year operated under a severe handicap because of the loss of many medium and large trawlers taken for military service. With the entrance of new vessels into the fishery and the return of a number of these boats to active fishing, landings gained 16 percent during the first half of 1944, compared with the same period last year.

In 1944 the important tuna fishery of the Pacific coast, which ranks fourth in productiveness among all fisheries of the United States and Alaska, is showing a gain of 50 percent in its landings. The pack of Maine sardines has increased 54 percent over the first 6 months of 1943, which will aid in supplying war-increased demands for canned fish. The Pacific mackerel fishery, on the other hand, again shows a reduction in its catch, but this industry is one that is normally subject to great fluctuations of yield, and the decline probably is not entirely due to war conditions. Similarly, the production of shrimp during the first half of 1944 has been disappointing, but the small catch has been due in large part to a scarcity of shrimp on the fishing grounds. A noticeable increase in the catch began during June, however, and with the months of heaviest landings still ahead, the year's production of shrimp may make a better showing.

Viewing the fisheries as a whole, a survey of production made by the Coordinator's Office at the end of June 1944, showed that the smaller catches in certain fisheries, compared with last year, have been more than offset by gains in others. The catch during the first half of the year normally amounts to only a fourth of the year's total, so it is too early to forecast with assurance the total production for 1944. It is believed, however, that it may reach 4,300,000,000 pounds.

This improvement in the condition of the fisheries has been brought about by unceasing effort and close cooperation on the part of industry and Government. When the Office of the Coordinator of Fisheries was established in July 1942, the fisheries of the Nation were in a serious condition of disorganization. The story of the effect of war on the fisheries has been told in many places, and need be only briefly summarized here.

The immediate loss of a large part of its most effective machinery of production crippled important segments of the industry at the outset of the war. The vessels requisitioned for the Army and Navy were, for obvious reasons, the largest and fastest boats in the fleet. The catching capacity of the pilchard fleet, which normally supplies a fourth of all fish caught in the United States and Alaska, was reduced materially. The Alaska salmon fishery lost the greater part of its floating equipment. In New England, the number of large trawlers was reduced one-half. On a somewhat lesser scale, the same condition prevailed in most important fisheries employing boats of any considerable size.

Security regulations placed restrictions on the movements of fishing boats, excluded enemy aliens from fishing crews, and reserved many formerly important fishing areas as mine fields or for target practice.

Repairs to vessels and engines were difficult to secure in busy shipyards, even when the necessary materials could be obtained. Netting was needed by the Army and Navy for camouflage, and supplies of manila, the cordage best adapted to marine operations, were shut off when the Japanese occupied the Philippines. In addition to these difficulties with operating equipment, an estimated one-fourth of the men who normally earn their living directly in the fisheries had either entered the armed services or had abandoned fishing to engage in other industries.

Confronted with this situation, the Coordinator's Office undertook as its first and most urgent task the restoration of vessels and other instruments of production to the fisheries. At the same time it gave its attention to the matter of reconciling the various security regulations and obtaining amendments or relaxations where possible so that the industry might have greater freedom of operation.

BUILDING UP THE DEPLETED FISHING FLEET

The Coordinator's Office immediately began negotiations through the War Shipping Administration to arrange for the return of vessels requisitioned for military service as soon as circumstances should permit their release. In some instances, a large number of boats had been taken as a precaution against emergencies which, fortunately, never materialized. This was true of the Alaska salmon fishery. Representatives of the Coordinator's Office were therefore able to arrange for the return of most essential vessels, cannery tenders, and boats to this industry before the opening of the 1943 season. Construction of new boats for specific military purposes gradually supplied the needs of the Army and Navy and in many instances the Coordinator's Office has been able to demonstrate that the requisitioned fishing vessels would be of greater service to the nation if returned to active fishing.

The total returns of requisitioned fishing vessels now amount, it is estimated, to about 40 percent of those originally taken. These include, in addition to the floating equipment of the salmon fishery mentioned above, vessels returned to the Pacific pilchard fishery, the New England vessel fisheries, the Atlantic coast menhaden fishery, and the sponge fishery. Additional craft probably will be returned in the near future because of the volume of new construction for the military services; some fishing vessels, however, will necessarily continue in active military service until the end of the war.

Much larger additions to the fishing fleet are being made through new construction. The role of the Coordinator's office in this program has been to allot controlled materials through the War Food Admin-

istration, approve authorized production schedules, and grant preference ratings to applicants who wish to construct vessels. During the period from May 13, 1943, to July 1, 1944, the Coordinator authorized the construction of 1,010 new fishing vessels. Of these, 661 were scheduled for completion by July 1, 1944; the balance during the second half of 1944 or sometime in 1945.

Construction needed merely as normal replacements for vessels lost at sea or worn out during the year is estimated at about 275 boats annually. However, the mounting volume of new vessel construction is such that, coupled with the return of requisitioned boats, it is considered that the fleet will shortly be restored to approximately its pre-war size, although shortages may remain in certain fisheries.

SECURING MATERIALS FOR REPAIR AND OPERATION

In addition to facilitating the construction of new vessels, the Coordinator's Office has sought to keep the existing fleet and shore processing facilities in good operating condition by providing materials for repairs and replacements.

During the period from April 1, 1943, to June 30, 1944, applications for more than \$1,185,000 worth of controlled materials and products destined for use in fishing vessels, engines, and shore processing plants were approved by the War Production Board on the Coordinator's recommendation. Applications for controlled materials included more than 11,670 tons of carbon steel, alloy steel, and copper and aluminum products for use in the construction of vessels and engines. Manufactured items for which priorities are required totaled more than \$4,428,000 worth of equipment including various types of engines, machines, refrigeration equipment, and canning machinery. The total number of individual transactions involved in the granting of priority assistance amounts to 891 for the period from April 1, 1943, to June 30, 1944, exclusive of vessels and marine engines.

By acting as a direct claimant in securing allocations of fish nets, twine, and cordage for the domestic fisheries, the Coordinator's Office has been successful in averting any serious shortage of netting with consequent interruption of production. Military needs for camouflage netting, which required a large percentage of the output of the fish net manufacturing industry until late in 1943, were satisfied by that time and the military contracts were cancelled. However, heavy demands for lend-lease and other foreign shipment remain and the normal flow of nets from the manufacturers to the distributors and users cannot yet be resumed. Vigilance and careful assessment of these various demands are still necessary to insure an adequate supply of netting for our domestic fisheries.

FISHERY MANPOWER

Maintaining production in the fisheries requires the maintenance of personnel for producing the catch and processing it for distribution and consumption. Like all other industries, the fisheries have lost many able and skilled young men to the armed services and the war industries. The problem of the Coordinator of Fisheries has been the extremely difficult one of attempting to protect fishery labor that is essential to production, of permitting the drafting of fishermen and processors who are less essential or less productive, and of assisting in recruiting replacements for the unavoidable manpower losses. This task has required the harmonizing and coordinating of the policies of the various Governmental agencies concerned with military and industrial manpower.

During the earlier part of the war the Coordinator's Office was moderately successful in obtaining deferment for men of all age groups who were felt to be essential to the effective prosecution of the fisheries. More recently, however, with a change in the policy of the Selective Service System regarding the deferment of men under 26, the fisheries have lost many highly skilled men for whom no satisfactory replacements can be found. In some localities, fishing vessels are tied up for lack of captains or crews. Without additional men to operate them, a number of the vessels recently built or returned from military service may remain inactive.

In addition to attempting to secure the deferment of essential men, the Coordinator's Office has considered various methods of recruitment, and in cooperation with other agencies has applied the most promising. Neither the use of prisoners of war nor the importation of foreign labor has proved practicable on a large scale. Some of the field representatives of the Coordinator's Office have been successful in programs of direct recruitment of fishermen. On the Coordinator's recommendation, the War Manpower Commission, through its local offices, has conducted manpower surveys for the fisheries and in some instances has undertaken active recruitment campaigns. Improved facilities have been obtained here and there for transporting cannery and other workers from outlying towns to ports of landing where fish are processed. These activities have helped in some measure to alleviate the situation, but a critical shortage of manpower persists in some fisheries. This situation is undoubtedly the most important obstacle to maximum fishery production.

SPECIAL PROGRAMS OF OPERATION

The role of the Coordinator's office has for the most part been confined to placing in the industry's hands the instruments of production and removing, insofar as it was possible to do so, restrictions and

hindrances to their effective use. In a few instances, however, it has proved necessary to exercise additional authority derived from the various Executive orders based on the Second War Powers Act, and to assume the broader powers of actual cooperative management of the Alaska, and later of the Puget Sound, salmon fisheries and the Pacific pilchard fishery.

SALMON CONCENTRATION PROGRAMS

The concentration program for the Alaska salmon fishery, which was inaugurated in 1943 and repeated at the request of the industry in 1944, was made necessary by the unusual situation in which the industry found itself at the close of the 1942 season. The loss of its floating equipment has already been described. In addition, it was expected that no more than 50 or 60 percent of the normal supply of labor would be available in 1943. Shipping facilities for transporting labor and canning equipment to Alaska for the comparatively brief fishing season were at a minimum.

To make the best possible use of available supplies and labor, the Secretary of the Interior issued an order concentrating the canning of salmon in 77 of the largest and most modern plants rather than in the 120 previously used. The concentration program was designed to make possible a reduction in manpower requirements by 5,030 persons, in north-bound passenger accommodations by 3,933 persons, in north-bound tonnage by 17,724 tons, in floating equipment by 86 tenders and 50 scows, and in fishing apparatus by 48 traps, 25 purse seiners, and 67,130 fathoms of gill nets. So effectively did the program operate in 1943 that 5,396,509 cases of salmon were packed during the season, an increase of 307,400 cases over the previous season.

With labor and transportation difficulties somewhat eased in advance of the 1944 season, it was possible to make certain relaxations in the program for this year, although it continues the essential features of the original concentration order. Continuation of the concentration plan after 1944 will be dependent on conditions and on the sentiment of the industry.

The success of the Alaska salmon concentration program in 1943 so impressed the salmon industry generally that the operators of the 11 canneries in the Puget Sound area petitioned the Coordinator of Fisheries to establish a similar program for that branch of the industry. Accordingly, a program was outlined in consultation with representatives of the industry. Under this program, 9 firms are operating jointly in the largest and most efficient cannery of the area, 2 plants are operating independently, and a smaller cannery has been designated a standby plant for use in case of emergency. The plan represents a saving of 525 cannery workers and 27 tenders and fishing

boats, which are thus released for use in other fisheries, and a considerable saving in fuel oil and critical repair and other maintenance material. A concentration program is particularly desirable in Puget Sound during the 1944 season, which is one of the "off years" in which relatively small runs of salmon are to be expected. In 1945, however, heavier runs should occur, and the desirability of modifying or abandoning the program will be given due consideration before the season opens.

PILCHARD PRODUCTION PLAN

Because of the heavy volume of its normal production, and also because of the great importance of its products to the war program, the effective operation of the Pacific pilchard fishery is a matter of national importance. Landings of pilchards normally amount to about one billion pounds annually, or a fourth of all the products of the fisheries of the United States and Alaska. Out of this catch, three to five million cases of canned pilchards or California sardines are packed, and over 14 million gallons of oil and 75,000 tons of meal are processed. Since 1941, the Government has requisitioned over half the canned pack each year for military and lend-lease requirements.

In an effort to secure maximum production and effective utilization of the catch, some degree of control over the pilchard fishery was instituted by the War Production Board in 1942. This control was not effective in accomplishing the desired results, however, and after the delegation of authority in this field to the Office of the Coordinator of Fisheries, the industry requested the issuance of new Government controls which would meet the requirements of the situation. In the early months of 1943 conferences were held with industry consultants, and mass meetings of fishermen, boat owners, and cannery and reduction plant operators were held in several cities in California. A plan was evolved which met the approval of the industry and was accordingly adopted. It provided for distributing the fishing activity and catch on the basis of (1) the Government requirements for canned sardines and sardine meal and oil; (2) the necessity of maintaining an even flow of raw material into the various ports and plants to insure that the equipment and manpower would be available at all times for processing the catch; and (3) the condition of fishing in the waters adjacent to each port.

In general, the Coordinated Pilchard Production Plan was well received and generally successful during the operating season of 1943-44. Aside from minor administrative difficulties, the chief difficulty was to maintain a fleet of sufficient size to supply canneries and reduction plants in the San Francisco area. This condition was aggravated by poor runs of fish and interruptions of fishing by unfavor-

able weather. The season's production in California as a whole was 473,450 tons, a decline of 9 percent from the previous 5-year average. Owing primarily to the shortage of cannery labor, the production of canned sardines declined materially, being 11 percent less than the 5-year average. However, a thorough analysis of the situation indicates that the pack would have suffered a further decline had no production program been in operation.

The industry was consulted at the close of the season as to the desirability of continuing the production program. The consensus favored a repetition of the program with minor improvements and provision for stricter enforcement during the 1944-45 season.

FISHERIES IN SOUND CONDITION FOR POST-WAR DEVELOPMENT

In spite of the heavy demand for the products of the fisheries and the difficulties under which the industry has operated, the fundamental condition of the resource is sound. As a result of the temporary reduction in the size of the fishing fleet, the intensity of fishing has declined in many areas and, as a result, signs of a relative increase in the abundance of many important commercial species have been noted. In carrying out the war program for increased production, the responsibility of preserving the Nation's basic fishery resources for future use has not been forgotten. Conservation regulations have been amended in only a few instances, when mature consideration indicated that such action would not endanger the stability of the resource. The wisdom of this policy is now apparent.

The Office of the Coordinator of Fisheries is a war-time agency, and as such has no permanent existence and no post-war program. Plans for the future development and expansion of the fisheries belong, rather, to the Fish and Wildlife Service and the individual States. The Coordinator's Office derives satisfaction, however, from its conviction that when its task is completed and the present controls over the fisheries are relinquished, the living resources on which they depend will be found in sound condition, unimpaired by the strains and demands of war.

National Park Service

NEWTON B. DRURY, Director



AS THE Nation approaches the decisive phases of total war, it is gratifying to report that the national parks as an institution have thus far stood intact. There is now reason to believe that they will emerge with their essential qualities and the pattern of their management relatively unimpaired, for even under the stress of national emergency general recognition has been given to the importance of protecting, in war as in peace, those portions of the Federal Estate which, because of significant features of beauty and interest, have been set aside to be held unchanged as part of the American heritage.

Recent annual reports have outlined the challenge that faced the Service in meeting the emergencies and making the contributions involved in World War II, at the same time giving protection to scenic, scientific, and historic aspects of the National Park System. Those reports explained the course pursued by the National Park Service, with the firm support of the Secretary of the Interior, in cooperating with war agencies without departing from the obligation of its stewardship.

After some 3 years of participation in the war program, involving more than 1,000 authorizations for uses of park lands and facilities, an appraisal of the status of the parks produces some interesting and reassuring facts. Although it is still too early to report definitely upon the effects of all park uses by military and other war agencies, a recent survey indicates that, although such uses have been much more numerous than expected, relatively little permanent impairment of park features has resulted, largely because of the cooperative, open-minded approach of the war agencies to each problem.

THREATS TO PARK CONSERVATION AVERTED

It has been fortunate that no desperate situation demanding destruction of major park features has arisen; and developments of the past year proved the wisdom of not yielding to pressure without

a reasonable showing of critical necessity. Park timber, urgently demanded on the ground of war needs, upon investigation was found not to be essential to victory, as alternatives proved to be available; invasion of California parks by cattle and sheep proved not to be essential to the public welfare and was found to be of negligible importance to the meat industry; an initial venture in removing strategic mineral ore from a national park was abandoned as uneconomical. Thus scenic, scientific, and cultural resources of the national parks, that would have been disastrously affected or even entirely destroyed had free rein been given to all agencies and industries demanding their use in the name of winning the war, are still held as a part of the Nation's treasure.

Sitka spruce.—Pressure for the logging of Sitka spruce in Olympic National Park was intensified at the beginning of the year. Anticipation of a shortage of this species for aircraft lumber to meet war needs in the spring and early summer had led to a request from the War Production Board for the release of the park spruce.

Although some of the lumber manufacturers were insistent, the Secretary of the Interior refused to act without satisfactory proof that the necessary aircraft spruce could not be obtained from other sources. While negotiations between the Department and the War Production Board were pending, the situation changed by reason of the Alaska Spruce Log Program of the United States Forest Service, greatly increased spruce production in British Columbia, increased production of aluminum available for plane manufacture, and the Army's cancelation of orders for certain types of wooden planes. The War Production Board thereupon withdrew its request.

Thus the threat of invasion of Olympic National Park by logging was safely outridden. Nevertheless, constant vigilance is necessary, since in some measure the drive was directed to the use of park forests to sustain private industries after the war.

Spruce and hemlock in Great Smokies.—War needs for wood pulp of the long-fibered type early in the spring of 1944 loomed as a threat to the remnant of virgin red spruce and hemlock in Great Smoky Mountains National Park.

Availability of these species in the park was investigated by representatives of the Paper Division of the War Production Board, the School of Forestry of North Carolina State College, and a local lumber company having nearby an idle pulp mill equipped to process these woods.

Fortunately, it was ascertained that numerous other species are available for the manufacture of long-fibered paper products and that many other mills are manufacturing long-fibered pulp.

Strategic minerals.—The apparent necessity of relieving the critical shortage of strategic minerals resulted in an exception to national park

policy in 1943. Mining of a deposit of tungsten in Yosemite National Park by the Metals Reserve Co., a Federal agency, was permitted upon recommendations of the Geological Survey, Bureau of Mines, and War Production Board. The company ceased operations in the fall of 1943, with approximately 55 tons of hard-sorted ore obtained, and permit therefor was revoked by the Secretary of the Interior as of December 27, 1943.

The Defense Plant Corporation, whose permit to extract salt from Death Valley National Monument as an emergency measure in connection with nearby magnesium production expired December 31, 1942, completed restoration work in the Badwater salt area of the monument in December 1943.

Grazing.—Remembering the experiences of World War I, when grazing was permitted as an emergency measure, the National Park Service during the present struggle definitely excluded livestock from the wilderness national parks. Its studies had revealed that the carrying capacity of all the national parks in the one State of California, where grazing was demanded by the cattlemen, would not exceed 6,000 cattle—less than one-half of 1 percent of that State's approximately 1,400,000 beef cattle—and that this slight contribution to the meat supply would entail heavy damage to park features.

Drought conditions in the spring of 1944 caused livestock growers in the interior valleys to renew efforts to secure grazing privileges in the Sierra Nevada national parks. With greater than normal cattle inventories, range conditions were about 50 percent of normal in early April and dry feeds were exceedingly short. Therefore, after conferences with representatives of livestock associations, war food administrators, and others, the Service recommended to the Secretary that he consider limited grazing in some national park areas in California as a wartime emergency if it were shown that such steps were necessary to save purebred breeding stock from starvation. The Secretary agreed to consider each case on its merits.

To investigate the need of such action, a grazing committee was established, including representatives of the Sierra Club, California Conservation Council, Western Federation of Outdoor Clubs, and United States Forest Service. After a thorough study of the situation, and after consultation with Government agencies charged with control of the wartime food supply, this committee reached the unanimous conclusion that to June 30 opening of national park lands to grazing was "not justified by manifest war necessity—nor is the purebred breeding stock of the herds for which applications have been submitted likely to be lost if park range is not made available." Expressing sympathy and understanding of the situation in which the applicants found themselves through their efforts to produce more meat, the committee nevertheless stated that it "would feel itself

hard-pressed to recommend to the Secretary that a natural resource within a park, such as its grasslands, should be utilized for what amounts to the economical stabilizing of a private operation on the outside."

In closing its report, the grazing committee stated that "if and as applications are submitted which fall clearly within the spirit of the Secretary's intent, the committee will recommend their approval."

Meanwhile, a bill (H. R. 5058) has been introduced in Congress by Representative Clair Engle to open all national parks and national monuments to livestock grazing for the duration of the war and six months thereafter.

HISTORIC OBJECTS THREATENED

Necessity for the salvaging of metals led to the suggestion that the historic cannon, monuments, and markers in the national military parks be melted down as an aid to the scrap drive. This was a real threat for a time, but was fortunately averted. The Service gathered in its areas over 8,500,000 pounds of scrap metal, but as to trophy ordnance and memorials raised with the War Production Board the question whether rare and irreplaceable historic relics should be scrapped until the national stockpile of useless and nonhistoric and nonartistic metal objects had been utterly exhausted. The point was made that each war memorial represents the last possible debt payment of the Nation to some soldier or group of soldiers in our national past, and that it would be of little comfort to the soldiers of the present day if such evidences of the Nation's gratitude should come to be lightly regarded.

In this connection, at least one patriotically intended, but impulsive and irrevocable act of salvage serves to give point to the position taken by the Service. The U. S. S. *Oregon*, famous for its spectacularly long and speedy run to participate in the American naval victory at Santiago Harbor in 1898, was withdrawn from active service in 1925 and maintained as a historic shrine by the State of Oregon. In 1942 this battleship was dismantled for scrap metal. Representative Homer D. Angell now doubts that an appreciable amount of salvage from the *Oregon* went into the war effort and has asked for an official investigation. In any case, that which to many citizens was a precious symbol of our freedom has now become a wistful memory, and the question "Was it really necessary?" is a question asked too late.

NATIONAL PARK SERVICE LAND POLICIES CHALLENGED

Partly due to war pressures, and partly because of growing conflicts between utilitarian and conservation concepts, there arose during the past year definite challenges to the land-acquisition policies of the

National Park Service, accompanied by widespread misconception of the Service's functions and purposes. This was the case in the controversy over Jackson Hole National Monument. It was also brought out in the Partial Report of the Senate Committee on Public Lands and Surveys Pursuant to Senate Resolution 241, Seventy-sixth Congress, which contained this statement:

There are certain Government agencies that habitually and regularly include in their withdrawals far larger areas than could possibly be justified after a careful examination of the actual and proper needs. Probably the most flagrant example of this constant overreaching is to be found in the actions of the National Park Service in the setting up of national parks and monuments. There is, apparently, no limit to the demands of that agency for additional areas to administer.

It is sincerely believed that this is a misconception of the attitude of the National Park Service.

Hearings were held during the year by a subcommittee of the Senate Committee on Public Lands and Surveys in various western towns. Administrative officials of the Service were asked to attend these hearings and endeavored to answer this charge. At the hearing in Fredonia, Ariz., the Director said in part:

We are confining our attention to the areas of national caliber which are outstanding in natural beauty, wildlife values, historical and scenic interest, and we can, I agree with you, readily imperil the high standards which we have tried to maintain for the national-park system, if we take in too much territory.

Now the question as to how much land it is reasonable to include in national parks and monuments, is, of course, debatable. The fact is that, of the total land area of the United States, only about three-quarters of 1 percent, at the present time, is included in all the different types of areas administered by the National Park Service. In general, our approach is not to add to this number of areas or acreage, except where there are outstanding examples of scenery and other values such as we are supposed to preserve in parks and monuments, examples that are distinctly of interest to the Nation as a whole * * * That, too, I think we have to do without injustice either to individuals concerned or the communities where these areas are located.

While at these hearings the National Park Service took exception to the charge of "land-grabbing," it has welcomed the opportunity to explain its land policies to members of Congress, to conservationists, to those who wish to use park lands for private commercial gain, and to the public generally, which stands to gain or lose most by any change in park conservation principles and practices since the national park areas are established "for the benefit and enjoyment of the people."

It is believed that an impartial review of the history of the National Park System will verify the statement that the long-range policy guiding its growth has been one of restricting the system to areas superlative in their own fields of scenery, natural science, or history. Em-

phasis has been placed upon quality rather than quantity, and upon national rather than the local significance of the areas acquired.

The Service would welcome an impartial reevaluation of the value of the National Park System in the light of the highest public use of the lands involved, from the standpoint of national interest.

Establishment of national parks by act of Congress began in 1872 with Yellowstone National Park. Up to 1916, when Congress created the National Park Service, 16 national parks, the Hot Springs Reservation, and 56 national monuments and related reservations had been established. Unquestionably, before 1916 a few areas had crept into the National Park System which did not measure up to national standards. No Federal agency existed to investigate the national importance of their scenic, scientific, or historic characteristics. The Service believes that had it been in existence at the turn of the century its stand against inclusion in the system of these substandard areas would have been heeded by Congress.

Since its organization the Service has hoped and planned to relinquish jurisdiction over some such properties. Unfortunately, in many cases this has been impossible. No units of the National Park System, whether established by act of Congress or by Presidential proclamation, may be abolished without authority of Congress. Paradoxical as it may seem in the face of the present Jackson Hole controversy, it is far easier to establish a new area with the approval of Congress than to abolish an existing one. Once a park or monument is established and accepted by the local people, its abolition usually is considered an affront to local pride.

Similarly, when the consolidation of national parks and allied areas under the National Park Service took place in 1933 by Executive order, certain areas were inherited which were not characteristic of the National Park System. Efforts to remove them from the national category and give them State or local park status have in general been met by united local opposition supported by Congressional delegations from the States concerned.

National cemeteries.—Among the areas transferred to National Park Service jurisdiction in 1933 were several national cemeteries within or near national military parks. Recently, the demand for burial space in these cemeteries has increased, giving rise to the question as to whether cemeteries in this group shall be enlarged. The National Park Service has taken the position that existing national cemeteries under its jurisdiction shall not be extended, since such increase would encroach upon the historic area of the national military park with which the cemetery is associated. Moreover:

eration of such enlarged cemeteries would not be a proper function of the Service.

It has been determined that the Chattanooga National Cemetery, Tenn., one of those transferred to the National Park System in 1933, is not located on historic ground and is not adjacent to Chickamauga and Chattanooga National Military Park. It has nearly 14,000 unoccupied grave sites. With the concurrence of the Secretary of War, and approval by the Bureau of the Budget, a draft bill to transfer jurisdiction over this cemetery to the War Department has been prepared for presentation to the Congress. This is typical of the endeavor of the Service to concentrate its activities in the fields primarily covered by the basic act establishing it.

Rejections of park proposals.—From 1933 to 1940 the Service investigated 353 areas proposed for national park, monument, or related purposes. Most of the proposals were disapproved on the ground that the areas under consideration were not of national park caliber. During the same period, 420 additional park proposals were made, but were not investigated or otherwise acted upon, largely because of lack of funds and personnel. Among the areas proposed for national park status which have been adversely reported upon were the scenic and well known Pikes Peak and Mount Baker.

As to the charge that "habitually and regularly" certain Governmental agencies "include in their withdrawals far larger areas than could possibly be justified after a careful examination of the actual and proper needs," the record shows that in wilderness national parks the National Park Service in general has erred in taking too little land, resulting in inadequate range for native wildlife and creating administrative difficulties; and Congress has frequently rectified such park boundaries.

Recreational demonstration areas.—In line with Congressional authority requested by the Department, upon advice of the National Park Service, and granted in 1942, more than half of the 46 "recreational demonstration areas" have been relinquished. Fifteen and part of another have been transferred to the respective States, and 2 others have been approved by the President for such transfer. Nine, and part of 1 other, have been added to the National Park System, primarily to existing park areas. One has been transferred to the Bureau of Reclamation. It is expected that 13 additional demonstration areas will be transferred to their respective States or political subdivisions thereof when these are in a position to administer them. Five are being retained in their present status awaiting determination as to their best disposition.

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The status of all 46 recreational demonstration areas is shown below:

Recreational demonstration areas, June 30, 1944

Area	State	Acreage	Disposition	Visitors
Acadia	Maine	5,654	Added to Acadia National Park, June 6, 1942.	(1)
Alexander H. Stephens Badlands	Georgia	940		7,300
	South Dakota	43,414	Added to Badlands National Monument by act of June 26, 1936.	(1)
Beach Pond	Rhode Island	3,481	Transferred to State, June 28, 1943	
Bear Brook	New Hampshire	6,436	Transferred to State, May 12, 1943.	
Blue Knob	Pennsylvania	5,136		7,143
Blue Ridge	(North Carolina	10,624	Added to Blue Ridge Parkway, June 30, 1936.	(1)
	Virginia			
Bull Run	do.	1,605	Designated as Manassas National Battlefield Park, June 10, 1939.	(1)
Camden Hills	Maine	4,962		5,495
Catoctin	Maryland	9,919		
Cheraw	South Carolina	6,825	6,619 acres transferred to State, June 9, 1944. 206 acres transferred to Fish and Wildlife Service, May 10, 1944.	
Chopawamsic	Virginia	15,984	Added to National Capital Park System, Aug. 13, 1940.	
Crabtree Creek	North Carolina	4,983	Transferred to State, April 6, 1943	
Culvre River	Missouri	5,759		16,006
Custer	South Dakota	20,405		
Fall Creek Falls	Tennessee	15,777	Transfer to State approved by President, awaiting acceptance.	1,547
French Creek	Pennsylvania	6,198	214 acres established as Hopewell Village National Historic Site, August 3, 1938. Remaining 5,984 acres added to Site, June 6, 1942.	(1)
Hard Labor Creek	Georgia	5,804		21,346
Hickory Run	Pennsylvania	13,386		9,008
Kings Mountain	South Carolina	10,147	3,972 acres added to Kings Mountain National Military Park, July 11, 1940. Remaining 6,175 acres transferred to the State, May 30, 1944.	(1)
Lake Guernsey	Wyoming	1,753	Transferred to Bureau of Reclamation, June 8, 1943.	
Lake Murray	Oklahoma	2,228	Transferred to State, February 20, 1943.	
Lake of the Ozarks	Missouri	16,196		10,522
Laurel Hill	Pennsylvania	4,026		11,331
Mendocino Woodlands	California	5,425		2,567
Montgomery Bell	Tennessee	3,746	Transferred to State, June 9, 1943.	
Montserrat	Missouri	3,441		24,706
Oak Mountain	Alabama	7,805	Transferred to State, Apr. 30, 1943.	
Otter Creek	Kentucky	2,445		4,726
Pere Marquette	Illinois	2,522	Transferred to State, May 7, 1943	
Pine Mountain	Georgia	3,032		3,413
Raccoon Creek	Pennsylvania	5,035		10,590
Roosevelt	North Dakota	66,376		12,450
St. Croix	Minnesota	18,499	Transferred to State, Sept. 27, 1943	
Shelby Forest	Tennessee	12,258	Transfer to State approved by President, awaiting acceptance.	32,950
Shenandoah	Virginia	10,129	Added to Shenandoah National Park, June 6, 1942.	(1)
Silver Creek	Oregon	4,093		3,901
Swift Creek	Virginia	7,605		67,843
Versailles	Indiana	5,371	Transferred to State, Apr. 20, 1943.	
Waysides (6 units)	South Carolina	228	Transferred to State, June 9, 1944.	
Do.	Virginia	206	Transferred to State, Mar. 26, 1943.	
Waterloo	Michigan	11,830	Transferred to State, June 15, 1943.	
Winamac	Indiana	6,233	Transferred to State, Apr. 20, 1943.	
White Sands	New Mexico	1,719	Added to White Sands National Monument, June 6, 1942.	(1)
Yankee Springs	Michigan	4,197	Transferred to State, June 15, 1943.	

¹ Visitors counted in park or monument totals.

Jackson Hole National Monument.—Still pending at the close of the year were the Barrett bill (H. R. 2241) to abolish the Jackson Hole National Monument and the suit of the *State of Wyoming v. Paul R. Franke* (Superintendent of Grand Teton National Park and of Jackson Hole National Monument), the latter to test the legality of the

establishment of the monument by the President on March 15, 1943, under authority of the Antiquities Act of 1906.

Following the hearings on the Barrett bill held in Washington in late May and early June 1943, further hearings were held in the Jackson Hole area the following August. Involved in these hearings were many issues which brought to a focus most of the basic problems of the National Park Service.

Of the area Frederic L. Paxton, distinguished historian of the West who was awarded the Pulitzer Prize for his *History of the American Frontier*, said: "Jackson Hole at the base of the Grand Tetons is not only a great scenic treasure but also an important early center of mountain fur trade and exploration of the far West. It should be preserved as a national monument." Similar opinions by authorities on geology and wildlife support the preservation of the Jackson Hole according to the National Park Service pattern.

That many of the local people are of the same opinion was evidenced by petitions received by the House Committee on Public Lands too late for inclusion in the printed hearings of the committee on the Barrett bill, but published in the *Congressional Record* of June 7, 1944. Approximately 100 "long-time residents of Jackson Hole, Wyo., * * * actively engaged in business here," expressed the belief that "Jackson Hole is one of the finest outdoor recreational areas in the world and * * * it should be protected and developed as such," and that "it is our final conclusion that it is time for us to work constructively together and to put an end to quarreling, and we urge upon our congressional delegation that they transfer their efforts from the present Barrett bill to efforts for constructive legislation that will supplement the monument proclamation, by giving permanence and certainty to the foregoing rights [valid existing claims already recognized by the Department] which, although now guaranteed by the statements of officials of the Interior Department, should be placed beyond any possibility of doubt by legislative action." Another petition, signed by eight prominent businessmen representing commercial interests in the Jackson Hole valued at more than half a million dollars, urged the Committee "not to undo the Jackson Hole National Monument, but, if it needs bettering in any way, that you strengthen and perfect it by legislation."

During the 1944 fiscal year the National Park Service gave the monument such protection against fires and vandalism as could be provided under the limitations of the 1944 Interior Department Appropriation Act, which provided that the Service might undertake only those administrative functions that were in operation on the lands prior to monument establishment. The 1945 Appropriation Act contains the same restriction.

In March 1944 the Public Lands Committee of the House of Representatives made a favorable report on the Barrett Bill to abolish the monument, and in May the Rules Committee of the House took action providing for a vote. The bill, however, to June 30 had not been called up.

Meanwhile, the trial of the *State of Wyoming v. Paul R. Franke* was held on August 21 at Sheridan, Wyo.¹

TRAVEL CONTINUES DESPITE WAR

Despite recurring rumors to the contrary, the national parks of the United States have not been "closed." They have remained open to travel, but on a limited-service basis. The Office of Defense Transportation necessarily tightened restrictions on pleasure-travel, and the National Park Service adhered strictly to the policy enunciated by the Secretary of the Interior of not encouraging visitors to the national parks.

The travel figures are interesting more for the trends indicated than for the totals. Due to the continued trend of diminishing travel, especially through July, August, and September, 1943 (the first months of the 1944 fiscal year), the total number of visitors for the fiscal year decreased to 7,455,271 from the 1943 fiscal year total of 8,193,090, a decline of 737,819 or 9 percent. The downward trend, gradually leveling off during the next 2 months, reached bottom about December 1, 1943, and has since reversed its direction to consistent and accelerating increases. The total of 3,818,766 visitors recorded during that portion of the 1944 fiscal year from December 1, 1943, to June 30, 1944, was an increase of 615,446, or 19.2 percent over the 3,203,320 recorded during the corresponding period of the 1943 fiscal year. An increase of 49 percent was recorded in June 1944 over June 1943.

On the basis of current travel trends, it is estimated that the total number of visitors for the 1944 travel year (October 1943 through September 1944) will equal 40 percent of the peak travel year of 1941 when there were 21,050,426 visitors.

The 2,149,398 military visitors during the 1944 fiscal year made up 29 percent of the total. In all, 4,135,052 men and women in uniform have visited the national parks and allied areas since Pearl Harbor.

Facilities available to visitors.—Park concessioners, as required under their contracts, provided limited service, such as stores, meals, and overnight accommodations, in those areas where the extent of wartime travel indicated a distinct need therefor. In the face of difficult operating conditions, this service to the public was well handled. All Office of Price Administration rules and regulations

¹ The case was taken under advisement and a decision is expected sometime after January 1, 1945.

with respect to meals and housing rate ceilings and the rationing of food and gasoline were strictly applied. No sightseeing trips were operated, practically all hotels were closed, and accommodations were the simplest compatible with the responsibility of providing for the public comfort.

CONCESSION POLICIES

The Department policy that concession facilities wherever possible should be installed and owned by the Government was further crystallized. This policy relates to ownership of the improvements and physical plant by the Government, and is quite distinct from the question of operation. Post-war construction programs were broadened to include plans and estimates for new Government-owned concession facilities in many areas. Concession facilities in 38 areas under National Park Service administration now are owned in whole or in part by the Federal Government.

National Park Concessions, Inc., the nonprofit distributing private corporation organized in 1941 to handle concession operations in facilities acquired through donation in Mammoth Cave National Park, extended its operations to include the concessions at Isle Royale National Park, Rosemary Inn in Olympic National Park, and Vanderbilt Inn in the Vanderbilt Mansion National Historic Site. It also acted in a managerial capacity at Lassen Volcanic National Park for the park concessioner. Its operations on the Blue Ridge Parkway were in abeyance during the year. The Secretary of the Interior designated National Park Concessions, Inc., to operate facilities in Big Bend National Park.

LOOKING INTO THE POST-WAR FUTURE

Past experience and present indications point to a speedy resumption in the early post-war period of the upsurge in national park travel that was interrupted when hostilities began late in 1941. Inherent in this anticipated increase will be diverse problems of protection, development, and use, requiring much thought and planning.

Typical of the most serious pending use-problems are: Control of concentration of visitors, fundamental to the protection of perishable features of certain western parks; possible future removal of concession facilities from areas of the greatest natural beauty; campground and forest encroachment conditions in Yosemite National Park; operation of Crater Lake National Park on a summer basis, avoiding costly snow-removal activities; and possible removal of Mount Rainier National Park headquarters to a more suitable site. Implicit in each of these situations, and many others of like nature, is the responsibility of the National Park Service, under mandate of Congress, to protect the natural features of the parks, while contributing to public enjoyment.

In the older national parks the original lay-out of visitor facilities under then-prevailing slow modes of travel, was based on the need for overnight accommodations within the parks and near points of major interest. In general, this condition no longer prevails. The question, therefore, arises: Should future planning envision only facilities as are necessary for daytime use, depending upon nearby communities to furnish sleeping accommodations as in the case of the Great Smoky Mountains National Park? Needless to say, there will always be certain areas where it would not be practicable to follow this procedure. But a trend away from developments of the resort type within the parks will serve the objective of holding the most valuable features of many areas unimpaired.

Post-war construction.—The National Park Service is not primarily a construction agency, but it stands ready, as part of its continuing program of providing facilities, to take a small, but nonetheless substantial, part in any national post-war public works program. When the Nation went on a war basis, the construction of all physical developments in national park areas was terminated, and there is now a backlog of urgently needed construction.

Studies have been made of the Master Plans, upon which all development is based, to ascertain the maximum amount of construction that could be promptly undertaken in connection with post-war public works financing. A suggested program of planning was prepared involving the expenditure, over a 3-year period, of \$4,750,000 for investigations, surveys, and the preparation of detailed plans, specifications, and estimates. This is essential, as it takes much time and thought to program construction in such manner as to retain the natural beauty of the native landscape. Based on such studies, the Service could have ready for initiation within a reasonable time a construction program involving about \$78,000,000 for parkway, major and minor roads, trails, and physical improvements. Experience indicates that the desirable pace for such construction would be at the rate of about \$22,500,000 per year. More than this might result in hurried and ill-advised construction.

During the 10 years of work relief programs most of the work in National Park Service areas that could be done by unskilled labor with restricted amounts of equipment and materials was accomplished. The bulk of needed future work could best be done under contract with responsible contractors possessing good equipment and experienced foremen and crews.

Studies as basis of park policy.—Post-war planning should include research projects and interpretive undertakings of prime importance in preserving basic park values. Studies of this nature are essential to intelligent administration and vital to the protection of historic and scientific resources. One such problem is to determine the extent

of permanent impairment that may result from development of tourist facilities and heavy use of park areas. There are kindred problems in forestry, wildlife, history, and other fields, regarding which investigations as to basic facts must precede the formulation of policies or the taking of action.

Airplanes.—Recognizing the tremendous impetus given to air travel by war-caused developments in aviation, the Service is looking ahead to its possible effect upon the national parks and has discussed the problem with representatives of the Civil Aeronautics Authority. Commercial and private aircraft will increasingly become a popular mode of transportation to the national parks, and will have to be reckoned with. It is felt, however, as in the case of rail and bus terminals, that airplane landing fields should be located outside park boundaries.

There will be a period of experimentation in this new and highly important field of air travel, and this phase of trial and error should not be allowed to impair the national parks. Experiments with air-transport, helicopter, or private plane should be carried on in other areas. When aircraft construction and use are stabilized, or when conditions change materially, this policy will be reviewed. Meanwhile, it is obvious that the construction of landing fields and auxiliary buildings would intrude upon park scenery; and that the noise and confusion of airplanes would disturb the native wildlife and would tend to destroy the character of these great areas as nature sanctuaries, especially affecting their atmosphere of serenity and peace, wherein lies their value for inspiration, recreation, and relaxation.

COOPERATIVE PLANNING STUDIES

By maintaining a review of the water control plans of various Federal and State agencies, the Service has been able to observe the trends in national water policy and water use developments, and their bearing upon the National Park System or on other park and recreational interests.

Potomac River recreational survey.—At the request of the War Department, the National Park Service made a study of the scenic, recreational, and historic features of that portion of the Potomac drainage basin upstream from Great Falls to the headwaters of the river, and the effect thereon of the proposals for a series of multiple use reservoirs. In putting its investigative facilities at the disposal of the United States Army Engineers the National Park Service in no way supported any plan to dam the Potomac River, which admittedly would adversely affect the environs of the National Capital.

Denison Dam and Reservoir recreational planning project.—This survey was completed and a report was prepared, including plans and recommendations. It recommends acquisition of 9,630 acres of

additional lands to permit establishment of two major recreational developments—one each in Texas and Oklahoma—and six minor developments. The estimated cost for acquisition and development is \$6,000,000.

Other recreational studies.—Recreational planning studies were continued, in cooperation with the Bureau of Reclamation, on the Grand Coulee Dam and Reservoir on the Columbia River, Wash., the Central Valley Reclamation Project in California, covering the Sacramento and San Joaquin watersheds; the Colorado River basin; and the Missouri River basin. There were further studies and research on the suggested Mississippi River parkway, of interest among Mississippi River States.

Alaska Highway study.—Field studies were made during the 1943 summer, of scenic, scientific, historical, and recreational features, and possible roadside developments, along that portion of the Alaska Highway located in the Territory of Alaska, as authorized by the President on January 8, 1943. Further studies are now in progress.

STATE RELATIONS

The Service has continued, but in a more limited way, to assist the States in their park planning and administrative problems. The principal assistance rendered has been the serving as an informal liaison between State park officials and war agencies in connection with the utilization of State parks and recreational areas for purposes relating to the prosecution of the war.

WILDLIFE OVER-POPULATION PROBLEMS

In war or peace, certain problems of protection and administration confront the National Park Service, notably in the fields of wildlife and forestry.

The basic wildlife policy has been one of permitting each species to carry on its struggle for existence without artificial aid, in the belief that this is for the ultimate good of the species, and conforms to the purpose of the parks. If conditions become such that a particular type will perish if not given especial protection, temporary resort may be made to control of natural enemies, artificial feeding, or such other measures as are necessary; directing the entire effort, however, toward placing the species as soon as possible upon a self-sustaining basis. During the past two decades over-population by grazing and browsing species in relation to the available winter range has increased, partly because of earlier artificial protective methods and partly because of growing restriction of once natural range outside these reservations. During the past year definite steps were taken to correct several of the most critical situations.

Yellowstone buffalo management.—This problem has been especially serious in Yellowstone National Park because of the complex pattern presented by the varied herbivorous forms that inhabit the area—deer, antelope, elk, moose, mountain sheep, and buffalo—and the limited winter range available. In considering the buffalo situation three salient points were taken into consideration: (1) The buffalo no longer faces extermination; numbers and distribution in the United States attest to its security as a species. (2) Continuance of the buffalo herd in Yellowstone is considered desirable and justifiable because the animals occurred there naturally, as evidenced by ancient skeletal finds. (3) Reduction of the herd is deemed imperative that Yellowstone National Park may be maintained as a natural area, and not as a zoological park or game farm. Present policy proceeds on the theory that ranch activity is no longer necessary, either for survival of the bison as a species or for the continuance of a normal number of buffaloes in the park.

To restore the buffalo to its normal place in the park fauna and to rehabilitate the range vitally needed by other wildlife species, the Lamar buffalo herd was reduced by 400 animals during the winter.

The ultimate plan for the Yellowstone buffalo herd contemplates a tapering off of feeding and placing the animals entirely upon their own resources. Hay will be kept on hand for several years to insure against potential adverse effects of unusual weather conditions before the herd reestablishes its natural feeding habits; and intensive studies will be made of its behavior under the new program. Future action will be based upon experience and investigation, but always with the ideal of maintaining the buffalo, like other species, as a wild animal in a natural environment, and not as the basis of an "animal show."

Yellowstone elk.—Because of the mild winter, most of the northern elk herd stayed in the park and the comparatively modest reduction planned through hunting north of the park could not be effected. The season closed on March 1, 1944, with a total estimated kill of 125 elk.

Zion Park deer.—Studies during the past decade revealed that mule deer in Zion National Park had increased far beyond food supply limits. Hunting outside the park boundary proved utterly ineffective in reducing the population or even in keeping it in bounds. Zion Canyon offers a sheltered wintering ground and freedom from predators, with the result that the range has been badly depleted. A few more years would have seen almost total destruction of food plants, as well as fatal deterioration of the deer. In cooperation with the Utah State Game Department, therefore, 300 deer were removed. The animals were killed by park rangers and turned over to the State game authorities.

Rocky Mountain Park elk and deer.—The east central region of Rocky Mountain National Park has been subjected to heavy overuse by elk and deer for at least 15 years. Original tendencies of the animals to migrate to lower elevations outside of the park have been inhibited by human developments blocking the original migration route. These ancestral winter ranges of the elk and deer, furthermore, have been devoted to close grazing by domestic stock. To meet this situation, plans were made in cooperation with the Colorado game authorities to reduce the herds by approximately one-third, or 200 deer and 300 elk. It was impracticable to carry out the program during the winter of 1943-44 (only 14 deer and 12 elk were eliminated) and it is planned to complete the program next winter.

WILDLIFE INVESTIGATIONS

In order to conserve, protect, and manage the important wildlife resources of the National Park System, insofar as diminished manpower and appropriations would permit, essential fact-finding programs were continued as to condition of, and changes in, important species. Assistance was furnished by the Fish and Wildlife Service for a faunal investigation on the western portion of Olympic National Park, and information supplied on the wildlife, particularly elk, in Jackson Hole National Monument. A life history study of the Yellowstone elk was resumed, to fill out many gaps in our knowledge of the famous northern herd, and to work out a successful management and range restoration program. A cooperative project is contemplated, with all Federal and State agencies concerned contributing information.

Yellowstone Park personnel initiated a life history study of the park buffalo. Studies were continued on the depleted winter range in the east central portion of Rocky Mountain National Park. The Zion National Park staff, assisted by an investigator of the Fish and Wildlife Service from the Utah Cooperative Wildlife Research Station, accumulated important data on the 300 deer that were eliminated from Zion Canyon in November and December 1943. Studies of the black bear in Yosemite Valley were made as a guide to management of that species. Bear feeding has been eliminated in all national parks. At Mesa Verde National Park, Colorado State officials continued investigations of forage on the mesa as a part of a regional program to determine carrying capacities for deer that range across national park, forest, and private lands without regard to boundaries. The Merriam turkey was restocked in Mesa Verde by the Colorado Game and Fish Commission. This species is known to have existed

there during the Indian era, but disappeared probably at the time of the great drought (A. D. 1276-99) that also forced aboriginal inhabitants to migrate.

PROTECTION OF PARK FORESTS

Protection of the remnants of the formerly widespread virgin forests of America now held as representative exhibits in the national parks continued to be a Service responsibility of first magnitude. The normal problems of protection from fire, insects, and disease and from preventable injury in areas of intensive use were further aggravated by the increasing shortage of experienced protection personnel, available fire fighters, and other workers.

During the 1943 calendar year 308 forest fires originated within or entered areas of the National Park System, a decrease of 23 percent from the previous 10-year average. A total of 10,444 acres was burned over, 70 percent of which involved a forest fire in Saguaro National Monument and a grass fire at Dinosaur National Monument.

The forest insect situation generally continued to be favorable, indicating the value of previous maintenance control measures. Three areas, however, reported threatening conditions. At Bryce Canyon National Park an epidemic of the Black Hills beetle required continued control. In Yosemite National Park, as a result of a fire in 1941, an epidemic of forest insects required control measures. A serious outbreak of the spruce budworm attacked spruce, Douglas-fir, and ponderosa pine in Rocky Mountain National Park. Experiments which indicate improved control methods are being undertaken with the cooperation of the Bureau of Entomology and Plant Quarantine.

The intensive white pine blister rust control program has resulted in initial control or reeradication work on 253,000 acres to date, leaving 190,000 acres within important pine areas of the national parks still unworked but needing attention. This threat to some of the finest forests in the parks is yearly becoming more imminent.

LAND STATUS

Since investigations have practically ceased for the duration, and acquisitions have been confined to acceptances of donations under authority of Congress or rectification of boundaries, land area changes were few during the past year. Especially noteworthy was establishment of the

NEW NATIONAL PARK AT BIG BEND, TEX.

This newest and twenty-seventh national park was established on June 12, 1944, in accordance with authority granted by Congress on June 20, 1935. Covering an area of 707,895 acres it is our sixth largest

national park. Its creation was made possible by the efforts and generosity of the State of Texas, which acquired and contributed all but 16,556.50 acres of the area to the Federal Government.

Big Bend National Park deserves the place it has been granted among the primary areas of the National Park System. It embraces a region of elusive lasting charm and arresting scenery. Perpendicular gorges cleft by the Rio Grande in the Santa Elena and Boquillas Canyons are a sharp contrast to the cool forested slopes and summits of the Chisos or "Ghost" Mountains that rise above the arid plain. Human history, rare wildlife species, mountain and desert plant life, and their combination in natural settings make it "a biological island in an expanse of desert." The paramount purpose of this national park must be the preservation of its vast wilderness as an inspiring "last frontier" on our southern border. The possibility of the establishment by Mexico of a similar park across the Rio Grande presents opportunity for a lasting memorial to international amity through linking the natural and human history of our two countries.

Developments for the benefit of visitors to the Big Bend will have to wait until the termination of the war. The necessary planning, however, is in progress.

HOME OF FRANKLIN D. ROOSEVELT NATIONAL HISTORIC SITE

By gift from President Roosevelt, title to his home at Hyde Park, N. Y., with approximately 33 acres of ground, passed to the United States on January 15, 1944, for preservation as a national historic site. Congress in 1939 authorized this step. The site adjoins the Library which the President gave to the Nation in 1939. Under the terms of the deed, actual administration of the national historic site for the benefit of the public shall begin when life interests held in the estate by the President, Mrs. Roosevelt, and the Roosevelt children shall have terminated. The property fronts on the historic New York and Albany Post Road. James Roosevelt, the President's father, acquired it in 1867, and the President was born there in 1882. The President's life has been intimately associated with this home, where since 1933 the heads of many foreign governments, including Prime Minister Churchill, have visited.

TOTAL ACREAGE ACCEPTED

The total acreage accepted by the Department of the Interior for park purposes during the year, both in established parks and approved projects, was 701,167.65 acres.

Lands acquired by the National Park Service July 1, 1943, to June 30, 1944

	Acquired by—	Funds expended		Acres	Total Federal lands in area (acres)
		Federal funds	Donated funds		
Acadia National Park, Maine.....	Donation.....	.....	.....	2,700.00	27,870.99
Antietam National Battlefield Site, Maryland.....	Donation.....	.....	.....	128.59	183.32
Appomattox Court House National Historic Monument, Virginia.....	Donation.....	.....	.....	.06	973.30
Big Bend National Park, Texas.....	Donation.....	.....	.....	691,338.95	691,338.95
Blue Ridge Parkway, Virginia.....	Transfer.....	.....	.....	105.80	38,910.00
Blue Ridge Parkway, North Carolina.....	Donation.....	.....	.....	1,679.58	
Colonial National Historical Park, Virginia.....	Purchase.....	\$14,000.00	\$31,001.00	214.83	7,057.78
Great Smoky Mountains National Park, Tennessee.....	Purchase.....	36,739.77	850.00	2,278.05	461,786.82
Hickory Run Recreational Demonstration Area, Pennsylvania.....	Purchase.....	3,700.00	.....	479.44	13,386.44
Home of Franklin D. Roosevelt National Historic Site, New York.....	Donation.....	.....	.....	33.23	33.23
Lassen Volcanic National Park, California.....	Exchange.....	.....	.....	40.00	101,840.41
Lava Beds National Monument, California.....	Donation.....	.....	.....	120.00	45,727.00
Mammoth Cave National Park, Kentucky.....	Donation.....	.....	.....	772.31	51,244.51
Morristown National Historical Park, New Jersey.....	Purchase.....	.....	9,441.25	291.02	
Natchez Trace Parkway, Alabama.....	Donation.....	.....	.....	.47	1,051.56
Olympic Coastal Parkway, Washington.....	Donation.....	.....	.....	432.62	13,648.87
Saratoga National Historical Park Project, New York.....	Transfer.....	.....	.....	86.85	43,398.36
	Purchase.....	.....	2,440.00	237.15	
	Purchase.....	.....	16,900.00	328.70	1,864.60
Total.....	.....	54,439.77	60,632.25	701,167.65	1,500,316.14
Lands in Federal ownership in other areas.....	.....	.....	.....	.....	20,896,495.44
Total.....	.....	.....	.....	.....	22,396,811.58
Less land transferred to:					
Navy Department from Colonial National Historical Park.....	Transfer.....	.....	.....	16.00	.....
State of Tennessee—Shelby Forest and Falls Creek Falls Recreational Demonstration Areas.....	Transfer.....	.....	.....	28,174.00	.....
Fish and Wildlife Services—South Carolina—Cheraw Recreational Demonstration Area.....	Transfer.....	.....	.....	206.10	.....
Eastern Band of Cherokee Indians, North Carolina—Great Smoky Mountains National Park.....	Sale.....	.....	.....	905.27	.....
State of California—Lassen Volcanic National Park.....	Exchange.....	.....	.....	6.25	.....
Less area transferred.....	.....	.....	.....	.....	29,307.62
Total Federally Owned Land.....	.....	.....	.....	.....	22,367,503.96
Non-Federal land within authorized boundaries.....	.....	.....	.....	.....	895,651.46
Grand total.....	.....	.....	.....	.....	23,263,155.42

NON-FEDERAL HISTORIC SITE ESTABLISHED

St. Paul's Church, Eastchester, National Historic Site.—Historic St. Paul's Church, associated with events leading to the establishment of the Bill of Rights, became a national historic site July 5, 1943.

No transfer of property from the Episcopal Church Corporation was made; but under the terms of the Historic Sites Act of August 21, 1935, the National Park Service will cooperate in its management and preservation. St. Paul's is a noteworthy example of the Renaissance revival style of architecture in America, and the best example now standing of the eighteenth century parish church of the central colonies.

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formulate a comprehensive program for the acquisition of these privately-owned lands. Legislation providing funds for a continuous land acquisition program directed to the acquisition of inholdings is sorely needed.

ADVISORY BOARD

The Interim Committee of the Advisory Board on National Parks, Historic Sites, Buildings, and Monuments met once during the year to advise on war and postwar problems. Attending were Edmund H. Abrahams (chairman), Dr. Waldo G. Leland, Col. Richard Lieber, Charles G. Sauers, Dr. Frank Setzler (secretary), and Dr. Ralph W. Chaney. Other members of the Board are Dr. Clark Wissler (vice chairman), Dr. Thomas Barbour, Dr. Herbert E. Bolton, Mrs. Reau Polk, and Dr. Fiske Kimball.

The death early in July 1943 of George De Benneville Keim, Board member, was reported last year. The Service now records with deep regret the death of another member, Col. Richard Lieber, noted authority on conservation. Colonel Lieber's contribution in the fields of conservation and the humanities, both to the Nation and to his own State of Indiana, cannot be overestimated. Service officials benefited greatly from his wisdom and experience.

Dr. Ralph W. Chaney, paleontologist of the University of California, was appointed a member of the board vice Mr. Keim. The vacancy created by Colonel Lieber's death has not yet been filled.

COOPERATING FEDERAL AGENCIES

Public Roads Administration.—New regulations implemented the working agreement that had been in effect since 1926 between the National Park Service and the Public Roads Administration. Included are new cooperative features applicable to the planning and construction of major roads and to planning for the maintenance of roads constructed by the Public Roads Administration. The regulations were approved by the Secretary of the Interior and the Federal Works Administrator pursuant to a requirement contained in the 1940 Federal Aid Highway Act.

Public Health Service.—A new agreement has been made with the United States Public Health Service providing that its eight district sanitary engineers shall furnish advice and service on sanitation matters in the National Park System. The high plane upon which this cooperative work has been conducted was largely due to the pioneering by Sanitary Engineer Harry B. Hommon, who retired in 1943.

Fish and Wildlife Service.—An agreement was reached between the Fish and Wildlife Service and the National Park Service as to the detailing of biologists for wildlife investigations in national park areas. This cooperation is especially helpful at a time when park protective and research staffs have been cut to a bare minimum.

Civilian Public Service Program.—Five Civilian Public Service Camps—conscientious objectors—again were allocated to the National Park Service and assigned to the Blue Ridge Parkway and Shenandoah, Great Smoky Mountains, Glacier, and Sequoia-Kings Canyon National Parks. These men were trained for and placed primarily on jobs involving forest protection, but also assisted in maintenance work, tree-disease control, and soil and moisture conservation in much the same manner as did the Civilian Conservation Corps on a much larger scale before the war. Their presence helped to meet the manpower shortage in the five areas concerned.

ADMINISTRATIVE ORGANIZATION

In general, the administrative organization remains unchanged as it concerned the responsibilities and activities of the Director's Office, located in Chicago as a wartime measure since August 1942. Organization of the four regional offices was improved, despite drastic personnel cuts. The units of the National Park System, particularly the smaller areas, have been hard put to it to carry their administrative responsibilities because of the loss of experienced members of their staffs, but have met these responsibilities well. Kings Canyon National Park and the adjoining Sequoia National Park were placed under a single superintendent for reasons of economy and effective administration.

The Service suffered a serious loss in the death of George A. Moskey, Chief Counsel, in February 1944. Mr. Moskey contributed much to Service policy and procedure during the formative years of the bureau and in the period of emergency expansion. Of him it has been said: "He was an attorney who knew how to apply the science of democratic government." The vacancy created by Mr. Moskey's death was filled by the transfer of Jackson E. Price from the position of Assistant Solicitor of the Department of the Interior.

The position of Biologist was established in the Director's Office and filled by the transfer back to the Service of Victor H. Cahalane, formerly Chief of the Wildlife Division, who, in a departmental reorganization in 1939, was transferred to the Fish and Wildlife Service. As chief of that agency's section on National Park Wildlife he handled park wildlife problems until his retransfer to the National Park Service.

Following the trends of previous years, the number of permanent full-time positions in the Service was reduced from the 1,974 reported on June 30, 1943, to 1,573 on June 30, 1944, resulting in severe handicaps in the basic fields of administration, protection, and maintenance. The number of employees of the Service just before Pearl Harbor was 5,963.

Increased use was made of women as park rangers and fire lookouts during the summer months; and as more veterans return to civil life attention is being given to placing them in vacant positions. By such means and the use of older men, with some relaxation of physical and qualifications standards, it has been possible to maintain reasonably adequate staffs despite the critical manpower shortage. The Service gained by the return of several of its supervisory officials released by the Army. On June 30, 651 National Park Service employees were on furlough with the armed forces and 617 had transferred to civilian war agencies with reemployment rights.

The highly trained, competent, and vigorous personnel who have left the Service to enter the armed forces constitute one of its most important contributions to the prosecution of the war. The Service recognizes an obligation to perpetuate for them the integrity of the National Park System. This obligation is being met by those who have remained, and who have shown themselves constant to their tasks. Their loyalty and devotion deserve clear recognition.

INFORMATION TABLE

There follows a table showing the units of the National Park System, including several projects now being administered by the Service pending transfer of lands, the acreage of these areas, and the number of visitors:

National Park System, acreage, and number of visitors

Areas (classification)	Location (State)	Net acreage	Approximate visitors, fiscal year July 1, 1943-June 30, 1944	Approximate visitors, 5-year average, 1940-44	Visitors, peak year (1941 unless otherwise stated)
<i>National Parks</i>					
Acadia.....	Maine.....	27,870.99	9,966	210,248	423,088
Big Bend.....	Texas.....	691,338.95	(1)	(1)	(1)
Bryce Canyon.....	Utah.....	35,980.08	8,014	65,270	124,098
Carlsbad Caverns.....	New Mexico.....	43,087.12	104,476	185,937	284,024
Crater Lake.....	Oregon.....	160,213.54	30,641	154,721	275,564
Glacier.....	Montana.....	997,400.36	25,542	106,795	210,072(1936)
Grand Canyon.....	Arizona.....	645,084.31	63,350	255,851	431,816
Grand Teton.....	Wyoming.....	94,852.84	10,854	63,972	153,353(1938)
Great Smoky Mountains.....	North Carolina-Tennessee.....	460,881.55	462,125	892,424	1,247,019
Hawaii.....	Hawaii.....	173,384.00	424,272	348,800	414,274(1943)
Hot Springs.....	Arkansas.....	1,015.27	223,392	199,288	273,083(1936)
Isle Royale.....	Michigan.....	133,838.51	5,026	34,433	7,257
Kings Canyon.....	California.....	453,048.02	51,151	126,993	201,545(1940)
Lassen Volcanic.....	do.....	101,880.41	19,991	68,198	108,663
Mammoth Cave.....	Kentucky.....	51,244.51	46,031	102,023	158,772
Mesa Verde.....	Colorado.....	51,149.12	4,584	23,190	42,079
Mount McKinley.....	Alaska.....	1,939,199.04	(1)	(1)	(1)
Mount Rainier.....	Washington.....	239,899.92	127,944	330,025	456,037(1940)
Olympic.....	do.....	845,759.47	62,168	71,241	92,968
Platt.....	Oklahoma.....	911.97	99,747	220,002	358,240(1939)
Rocky Mountain.....	Colorado.....	252,625.87	127,450	438,160	685,393
Sequoia.....	California.....	385,100.13	63,599	196,354	300,012
Shenandoah.....	Virginia.....	193,472.98	66,165	574,692	1,054,479
Wind Cave.....	South Dakota.....	11,818.34	3,359	12,405	108,943(1929)
Yellowstone.....	Wyoming, Montana, and Idaho.....	2,213,206.55	68,942	325,910	581,761
Yosemite.....	California.....	756,294.65	122,618	370,329	594,062
Zion.....	Utah.....	94,201.06	43,710	116,587	190,016

See footnotes at end of table.

National Park System, acreage, and number of visitors—Continued

Areas (classification)	Location (State)	Net acreage	Approximate visitors, fiscal year July 1, 1943-June 30, 1944	Approximate visitors, 5-year average, 1940-44	Visitors, peak year (1941 unless otherwise stated)
National Historical Parks					
Abraham Lincoln	Kentucky	110.50	12,440	80,241	175,000 (1934)
Chalmette	Louisiana	29.52	56,398	38,642	48,216 (1943)
Colonial	Virginia	7,057.78	247,322	428,298	663,971 (1937)
Morristown	New Jersey	1,051.55	96,596	156,060	221,779
National Monuments					
Ackia Battleground	Mississippi	49.15	(1)	(1)	(1)
Andrew Johnson	Tennessee	17.08	14,094	14,220	6,898 (1943)
Appomattox Courthouse	Virginia	973.30	5,500	15,185	50,000
Arches	Utah	34,139.70	744	2,006	3,786
Aztec Ruins	New Mexico	25.88	4,949	9,053	20,214 (1938)
Badlands	South Dakota	122,812.46	9,234	129,159	251,498
Bandelier	New Mexico	25,971.89	7,065	8,921	14,619 (1938)
Big Hole Battlefield	Montana	200.00	(1)	1,962	4,000
Black Canyon of the Gunnison	Colorado	12,040.55	3,141	11,247	19,307 (1940)
Cabrillo	California	50	(1)	88,810	234,465 (1937)
Canyon de Chelly	Arizona	83,840.00	456	1,596	2,733 (1940)
Capitol Reef	Utah	33,068.74	(1)	1,970	2,100
Capulin Mountain	New Mexico	680.37	10,708	25,199	35,550
Casa Grande	Arizona	472.50	8,660	14,435	37,244 (1929)
Castillo de San Marcos	Florida	18.51	142,139	215,552	297,620
Castle Pinckney	South Carolina	3.50	(1)	(1)	(1)
Cedar Breaks	Utah	6,066.60	4,479	10,553	22,500 (1938)
Chaco Canyon	New Mexico	18,039.39	2,995	2,117	8,014 (1937)
Channel Islands	California	1,119.98	(1)	(1)	(1)
Chiricahua	Arizona	10,529.80	3,877	7,979	15,331 (1934)
Colorado	Colorado	18,060.45	5,737	22,018	64,715 (1938)
Craters of the Moon	Idaho	47,540.70	1,909	12,006	21,796
Death Valley	California-Nevada	1,850,565.20	12,098	59,734	96,529
Devil Postpile	California	798.46	(1)	14,443	10,251
Devils Tower	Wyoming	1,193.91	5,412	21,433	53,389 (1938)
Dinosaur	Utah-Colorado	183,221.56	1,477	6,006	10,928 (1940)
El Morro	New Mexico	240.00	421	1,086	5,794 (1926)
Father Millet Cross	New York	.01	(1)	(1)	(1)
Fort Jefferson	Florida	86.82	(1)	(1)	(1)
Fort Laramie	Wyoming	214.41	1,252	4,688	10,102 (1940)
Fort Matanzas	Florida	18.34	2,163	11,425	21,370 (1939)
Fort McHenry	Maryland	47.64	281,251	432,154	660,403
Fort Pulaski	Georgia	5,427.39	(1)	22,410	55,536
Fossil Cycad	South Dakota	320.00	(1)	(1)	100 (1935)
George Washington Birthplace	Virginia	395.44	9,193	31,255	65,154 (1932)
Gila Cliff Dwellings	New Mexico	160.00	(1)	191	330
Glacier Bay	Alaska	2,299,520.00	(1)	(1)	(1)
Grand Canyon	Arizona	195,231.00	(1)	164	324
Gran Quivira	New Mexico	370.94	321	1,745	4,812 (1930)
Great Sand Dunes	Colorado	36,849.19	2,788	6,678	11,700 (1939)
Holy Cross	do	1,392.00	(1)	124	600 (1935)
Homestead National Monument of America	Nebraska	160.82	(1)	280	1,400
Hovenweep	Utah-Colorado	285.80	41	178	500 (1937)
Jackson Hole	Wyoming	173,064.62	(1)	(1)	(1)
Jewel Cave	South Dakota	1,274.56	31	12,509	5,203 (1939)
Joshua Tree	California	653,123.70	14,487	16,058	27,747 (1942)
Katmai	Alaska	2,607,590.00	(1)	(1)	17 (1924)
Lava Beds	California	45,727.00	8,286	24,283	36,619 (1940)
Lehman Caves	Nevada	639.31	830	3,021	5,000
Meriwether Lewis	Tennessee	390.00	3,567	12,707	21,281
Montezuma Castle	Arizona	520.00	3,036	6,457	19,298 (1930)
Mound City Group	Ohio	57.00	(1)	(1)	35,260 (1935)
Muir Woods	California	424.56	105,397	123,136	179,365 (1939)
Natural Bridges	Utah	2,740.00	110	483	1,044 (1939)
Navajo	Arizona	300.00	45	303	965 (1929)
Ocmulgee	Georgia	683.48	27,463	41,511	63,330
Old Kasaan	Alaska	38.00	(1)	(1)	(1)
Oregon Caves	Oregon	480.00	(1)	28,601	57,704
Organ Pipe Cactus	Arizona	328,161.73	65,492	27,042	50,842 (1943)
Perry's Victory and International Peace Memorial	Ohio	14.25	14,794	25,996	75,000 (1938)
Petrified Forest	Arizona	84,597.10	37,963	138,707	240,967
Pinnacles	California	12,817.77	4,779	16,996	28,036
Pipe Spring	Arizona	40.00	425	1,105	24,883 (1929)

See footnotes at end of table.

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National Park System, acreage, and number of visitors—Continued

Areas (classification)	Location (State)	Net acreage	Approximate visitors, fiscal year July 1, 1943-June 30, 1944	Approximate visitors, 5-year average, 1940-44	Visitors, peak year (1941 unless otherwise stated)
National Monuments—Continued					
Pipestone.....	Minnesota.....	115.08	2,372	1 1,470	2,785
Rainbow Bridge.....	Utah.....	180.00	(1)	1 134	550 (1936)
Saguaro.....	Arizona.....	53,669.24	4,653	12,034	20,422 (1938)
Santa Rosa Island.....	Florida.....	9,500.00	451,246	1 273,182	405,968
Scotts Bluff.....	Nebraska.....	2,292.15	29,665	65,513	108,536 (1940)
Shoshone Cavern.....	Wyoming.....	212.37	(1)	(1)	(1)
Sitka.....	Alaska.....	67.00	4,484	6,500	9,185 (1942)
Statue of Liberty.....	New York.....	10.38	345,299	375,963	446,364
Sunset Crater.....	Arizona.....	3,040.00	2,392	7,934	12,944
Timpanog Cave.....	Utah.....	250.00	18,715	11,867	16,673 (1943)
Tonto.....	Arizona.....	1,120.00	3,008	5,517	9,423
Tumacacori.....	do.....	10.00	5,016	8,164	18,472 (1937)
Tuzigoot.....	do.....	42.67	3,271	5,461	9,350
Verendrye.....	North Dakota.....	253.04	(1)	1 3,250	15,000 (1928)
Walnut Canyon.....	Arizona.....	1,635.32	4,036	9,222	13,526 (1938)
Wheeler.....	Colorado.....	390.00	(1)	1 285	511 (1940)
White Sands.....	New Mexico.....	137,885.91	34,69	54,779	110,805 (1938)
Whitman.....	Washington.....	45.83	(1)	1 1,640	8,204
Wupatki.....	Arizona.....	34,693.03	438	2,309	4,153
Yucca House.....	Colorado.....	9.47	26	75	400 (1937)
Zion.....	Utah.....	33,533.01	(1)	1 100	500
National Military Parks					
Chickamauga and Chattanooga.....	Georgia-Tennessee.....	8,146.33	100,755	279,387	481,381 (1940)
Fort Donelson.....	Tennessee.....	102.54	7,078	28,206	41,908
Fredericksburg and Spotsylvania County Battlefields Memorial.....	Virginia.....	2,420.15	37,739	91,133	156,038
Gettysburg.....	Pennsylvania.....	2,425.25	87,312	382,286	1,554,234 (1936)
Guilford Courthouse.....	North Carolina.....	148.83	11,742	29,610	53,293
Kings Mountain.....	South Carolina.....	4,012.29	7,821	17,450	29,487 (1939)
Moores Creek.....	North Carolina.....	30.00	5,610	4,389	6,218 (1938)
Petersburg.....	Virginia.....	1,328.25	87,336	185,707	263,169
Shiloh.....	Tennessee.....	3,716.66	48,883	168,092	346,069 (1938)
Stones River.....	do.....	323.86	10,649	5,277	6,542
Vicksburg.....	Mississippi.....	1,323.56	9,031	130,747	317,120 (1938)
National Historic Sites					
Atlanta Campaign Markers.....	Georgia.....	20.96	(1)	(1)	(1)
Federal Hall Memorial.....	New York.....	49	110,255	1 63,139	126,737 (1942)
Fort Raleigh.....	North Carolina.....	16.45	9,104	19,881	76,016
Home of Franklin D. Roosevelt.....	New York.....	33.23	(1)	(1)	(1)
Hopewell Village.....	Pennsylvania.....	6,197.00	32,246	1 31,557	85,562
Jefferson National Expansion Memorial.....	Missouri.....	82.58	32,252	1 12,027	34,914 (1943)
Manassas National Battlefield Park.....	Virginia.....	1,604.57	5,250	1 6,504	11,494 (1943)
Old Philadelphia Customhouse.....	Pennsylvania.....	.79	23,838	1 8,847	15,489 (1943)
Salem Maritime.....	Massachusetts.....	8.61	4,875	5,453	7,256 (1942)
Vanderbilt Mansion.....	New York.....	211.65	20,950	1 11,282	17,669
National Battlefield Sites					
Antietam.....	Maryland.....	183.32	12,951	20,697	88,049 (1937)
Brices Cross Roads.....	Mississippi.....	1.00	(1)	1 1,290	3,200 (1940)
Cowpens.....	South Carolina.....	1.00	(1)	1 1,250	5,150 (1942)
Fort Necessity.....	Pennsylvania.....	2.00	13,350	52,321	107,533 (1938)
Kennesaw Mountain.....	Georgia.....	60.00	15,177	13,044	18,439 (1942)
Tupelo.....	Mississippi.....	1.00	(1)	1 3,660	7,500 (1940)
White Plains.....	New York.....	.00	(1)	(1)	(1)
National Memorials					
Camp Blount Tablets.....	Tennessee.....	(1)	(1)	(1)	(1)
House Where Lincoln died.....	District of Columbia.....	.05	52,085	36,638	91,724 (1937)
Kill Devil Hill.....	North Carolina.....	314.40	10,427	41,245	84,194
Lee Mansion.....	Virginia.....	.50	170,380	274,610	729,652 (1937)

See footnotes at end of table.

National Park System, acreage, and number of visitors—Continued

Areas (classification)	Location (State)	Net acreage	Approximate visitors, fiscal year July 1, 1943-June 30, 1944	Approximate visitors, 5-year average, 1940-44	Visitors, peak year (1941 unless otherwise stated)
National Memorials—Con.					
Lincoln Memorial.....	District of Columbia.....	(1)	613,887	1,130,043	1,796,752
Lincoln Museum.....	do.....	.18	85,783	62,123	132,787(1937)
Mount Rushmore.....	South Dakota.....	1,710.00	30,355	118,997	400,000
New Echota Marker.....	Georgia.....	1.00	(1)	13,027	6,090(1940)
Thomas Jefferson Memorial.....	District of Columbia.....	(1)	408,323	154,251	463,555(1943)
Washington Monument.....	do.....	(1)	514,474	752,071	998,686(1937)
National Cemeteries					
Antietam.....	Maryland.....	11.36	(1)	(1)	(1)
Battleground.....	District of Columbia.....	1.03	2,700	3,400	5,000
Chattanooga.....	Tennessee.....	136.15	(1)	(1)	(1)
Custer Battlefield.....	Montana.....	757.84	15,312	23,684	65,132
Fort Donelson.....	Tennessee.....	15.34	(1)	(1)	(1)
Fredericksburg.....	Virginia.....	12.00	(1)	(1)	(1)
Gettysburg.....	Pennsylvania.....	15.55	(1)	(1)	(1)
Poplar Grove.....	Virginia.....	9.02	(1)	(1)	(1)
Shiloh.....	Tennessee.....	10.25	(1)	(1)	(1)
Stones River.....	do.....	20.09	(1)	(1)	(1)
Vicksburg.....	Mississippi.....	119.76	(1)	(1)	(1)
Yorktown.....	Virginia.....	2.91	(1)	(1)	(1)
National Capital Parks¹					
The park system of the District of Columbia.....		27,790.36	(1)	(1)	(1)
Parkways					
Blue Ridge.....	Virginia - North Carolina.....	38,910.00	194,107	315,141	965,507
George Washington Memorial.....	Virginia-District of Columbia.....	2,458.68	(1)	(1)	(1)
Natchez Trace.....	Mississippi, Alabama, and Tennessee.....	13,648.87	(1)	(1)	(1)
Total National Park System.....		20,455,014.29	7,218,122	13,056,451	-----
National Recreational Area					
Boulder Dam.....	Arizona-Nevada.....	1,680,133.33	236,101	526,219	838,246
Projects					
Saratoga National Historical Park.....	New York.....	1,864.60	5,962	18,866	72,591
Kennesaw Mountain National Battlefield Park.....	Georgia.....	3,034.21	(1)	(1)	(1)
Richmond National Battlefield Park.....	Virginia.....	.00	(1)	(1)	(1)
National Historic Sites in Non-Federal Ownership					
Gloria Dei (Old Swedes' Church).....	Pennsylvania.....	1.53	(1)	(1)	(1)
Independence Hall.....	do.....	4.55	(1)	(1)	(1)
Jamestown Island.....	Virginia.....	22.00	(1)	(1)	(1)
McLoughlin Home.....	Oregon.....	.63	(1)	(1)	(1)
Saint Paul's Church.....	New York.....	6.09	(1)	(1)	(1)
San Jose Mission.....	Texas.....	4.13	(1)	(1)	(1)
Grand total.....		22,140,085.36	7,460,185	13,601,536	-----

¹ Travel figures not available or maintained.² Travel figures available for less than five years.³ Closed to visitors.⁴ Established by Presidential Proclamation, March 15, 1943.⁵ Included in travel figures for adjacent battlefield site, military park, or historical park.⁶ Travel included under "Memorials."⁷ Includes Chopawamsic area, Virginia, and C. & O. Canal, Maryland.⁸ Administered by Service pending final establishment.⁹ Includes 2,149,396 military visitors.

Office of Indian Affairs

JOHN COLLIER, Commissioner



THE truly epic story of Indian heroism on all the battle fronts of the planet, unstintingly backed by the toil of Indian men, women, and children on farm and range and in the war industries, has broadened and deepened during the past year.

On the first of April, 21,756 Indians, exclusive of officers, had joined the fighting forces, of which number 19,284 were in the Army, 1,555 in the Navy, 574 in the Marine Corps, 127 in the Coast Guard, and 216 in the Wacs and Waves.

NUMEROUS DECORATIONS

Throughout the Pacific area, in China, North Africa, Sicily, Italy, and Normandy, Indians have served with conspicuous gallantry, winning all decorations, in addition to numerous citations and commendations. By the end of June, 16 had received the Distinguished Flying Cross; 29, the Air Medal; 20, the Silver Star; 4, the Distinguished Service Cross; 1, the Soldier's Medal; 1, the Distinguished Service Medal; 1, the Navy Cross; 1, the Medal of Honor; and 1, the Croix de Guerre. Seventy-five had been awarded the Purple Heart. Some had received more than 1 decoration, and numerous Oak Leaf Clusters had been distributed in lieu of further awards of a given medal or in recognition of flying missions achieved. Several had received from 6 to 14 Clusters each.

THE CONGRESSIONAL MEDAL OF HONOR

Until April last, no Indian had received the Congressional Medal of Honor. Now, thanks to Second Lieutenant Childers, a three-quarters Creek of Broken Arrow, Okla., this honor also may be claimed by the first Americans. Lieutenant Childers, who had won his commission on the battlefield during the invasion of Sicily, was awarded the nation's highest military honor as the result of an all but incredible

exploit performed near Oliveto, Italy, in September 1943. Hobbling with a broken instep, he advanced alone against three German machine-gun nests, rubbed them out, and opened the way for the advance of his battalion which had been in danger of annihilation. Only 14 Medals of Honor have been awarded thus far in the war, 3 in the Mediterranean theater.

A GLOBE-EMBRACING STORY

Decorations serve only to highlight the globe-embracing story of the Indian fighting man's gallantry and efficiency, as indicated by reports from all fronts. A group of 13 Indians from nearly as many tribes was in the first wave of paratroopers dropped with demolition equipment upon German defenses in France at the beginning of the Normandy drive. Harlyn Vidovich, "The Sky Chief," a Shoshone-Paiute of Sacaton, Ariz., won fame as one of General Chennault's "Flying Tigers," was commended by General Chiang-Kai-shek, and was promoted to the grade of captain shortly before his death in China last January. A noted Cherokee woodcarver, Going Back Chiltoskey, was employed by the Engineer Board in making scale models of terrain and buildings for the plans of the African invasion. It was an Omaha Indian boy, Pvt. Robert Stabler, who, in July last year, landed alone under heavy fire in advance of the assault waves at Licata, Sicily, to mark the beaches for the infantry craft—an exploit for which he received the commendation of his general. He had volunteered for service at the age of 20, and he wore no medal when he died of wounds in Italy last January.

The story of Indian heroism cannot be told in terms of medals and commendations. It is woven closely into the untold all-American tale of high heroism everywhere, regardless of race and color and creed.

FAITH AND WORKS

The profound seriousness with which Indians generally are devoting their energies to the prosecution of the war has been conspicuously evidenced by the religious observances of the homefolk. Indians in the old days, interwove religion into everyday living to an extent unknown in white society; and out of the depths of racial memory, sacred ceremonies have been revived by many tribes as an expression of their dedication to a great common cause and their dependence upon divine aid for its achievement. In various instances, Christian Indians have joined their prayers with the ancient supplications of their people, in the true American spirit of religious liberty. These expressions of profound faith and dedication, notably increased during the past year, have accompanied heroic works at home, as well as abroad, even as in the old days.

THE GREATEST EXODUS OF INDIANS

The war has brought about the greatest exodus of Indians from reservations that has ever taken place. Out of a total of approximately 65,000 able-bodied men from 18 to 50 years of age, 30 percent have joined the armed forces and about 25 percent are engaged in war industries and other essential war services. In addition, more than 10,000 men, women, and children have left the reservations for varying periods to work on farms and ranches. Thus, at least half of the able-bodied men and about one-fifth of other employable persons have been drained from the reservations. Reports show that there were 8,683 fewer Indian families residing at home in 1943 than in 1941.

WOMEN, CHILDREN, AND OLD MEN CARRY ON

Notwithstanding this great loss of manpower at home, the total production of agricultural commodities by Indians on all reservations was greater in 1943 than in 1942. Approximately 1,000 more families engaged in farming and stockraising. Although a greater acreage of land was planted to all crops, less grain and feed were sold, owing to the increased feed requirements of the great number of livestock on hand. At the end of 1943, Indians on all reservations owned a total of 1,531,000 head of livestock—90,000 more than at the end of the previous year, and, incidentally, double the number owned by them in 1933. The total receipts from livestock sales in 1943 amounted to \$10,533,079, which was \$667,000 greater than in 1942, and five times more than in 1933. The total value of all sales of Indian agricultural products was \$19,077,333, compared with \$17,457,241 in 1942; and the total value of all food produced and used in the home was \$8,364,792, compared with \$7,985,584 in the preceding year.

This remarkable achievement may be credited largely to the eagerness and ability of Indian women, children, and older men to carry on while the young men are away. The bond between the Indian and his homeland is very strong, and most Indians in the far-flung battle areas write home, giving instructions for the management of livestock and farming operations, and dwelling on the plans they have in mind for the post-war years.

REMARKABLE ACHIEVEMENT OF SCHOOL CHILDREN

The same enthusiastic response to the needs of the time was to be noted in the schools of the Indian Service, whose production of fruits, vegetables, meat, milk, and eggs was almost 50 percent greater in 1943 than in the previous year, although many high school students were serving in the armed forces or in war industries. Nearly 3 million pounds of fruits and vegetables were stored and used. A large number of the schools were on a self-sustaining basis, so far as agricultural

produce was concerned, and large quantities of vegetables, meat, milk, and eggs were marketed for the general need. Fifty-eight thousand gallons of fruit and vegetables were canned.

Dehydrators, on the model developed at the Phoenix Indian School, in collaboration with the United States Department of Agriculture, were erected at half a dozen other schools in the Indian Service. As a result, more than ten tons of fruits and vegetables were dehydrated in the schools of the Indian Service, from which supply the boarding schools and hospitals in Alaska were furnished most of their vegetables for the year at a great saving in freight cost. In addition to the foregoing, the Indian schools produced more than 9,000 tons of hay, nearly 3,000 tons of grain, and more than 5,000 tons of silage.

A great share of the labor involved in producing such quantities of foodstuff was furnished by the Indian boys and girls themselves, and many employees of the Indian Service sacrificed their vacation time that they might help in the fields.

INVESTING IN DEMOCRACY

The Indian people's faith in their country and their devotion to the cause of Democracy have been further attested by their war bond purchases.

It is estimated that bond sales to Indians had reached a grand total of \$50,000,000 on June 30. During the fiscal year 1944, group investments amounted to \$2,517,000, and sales to restricted Indians totaled \$1,525,664. In addition, during the year the Office of Indian Affairs had received for safekeeping bonds purchased by individuals with their unrestricted funds in the amount of \$92,438. The latter item represents only a portion of such purchases.

On many reservations war bond auction sales and bond pow-wows have been patronized with remarkable enthusiasm. In January, the Lower Brule Sioux sponsored an auction at Reliance, S. Dak., in which donations, ranging from a sack of peanuts to poultry and horses, garments and fancy quilts, were disposed of to the highest bidder in bonds. Sales totaled \$22,000, half of which was realized through the donations of the Indians. A Sioux boy sacrificed his pet colt, which brought \$925 in securities. An old longhair wept when told that he could not donate 320 acres of land to the cause.

The Phoenix Indian School was awarded the Treasury Department's certificate of merit for its success in organizing a bond pow-wow that resulted in sales amounting to \$58,177. In the Fourth War Loan Drive, the Papago Reservation exceeded its quota by almost 600 percent, although the State of Arizona as a whole fell behind. In Alaska, many isolated villages have sacrificed the white man's food and clothing in order to buy bonds.

Although the amount donated by Indians to the Red Cross and to the National War Fund cannot be stated with accuracy, it is known to be very large and in proportion to the general whole-hearted response of Indians to the needs of the time.

LAND ACQUISITION

Although no additional public funds for land purchases were appropriated for the fiscal years 1944 and 1945, funds appropriated in past years permitted purchases involving 17,337.29 acres at a cost of \$105,860.70. Also, 631,887.51 acres were restored to tribal ownership on the Wind River Reservation in Wyoming, under authority of the act of July 27, 1939.

The desire of the Indians to increase their land holdings is evidenced by the fact that tribal funds amounting to \$183,450.68 were used during the past year in purchasing 37,720.18 acres on 12 reservations. Many tribes possessing funds have demonstrated their determination to invest a substantial portion of their money in this way. In addition to the above, 2,680 acres were withdrawn from the public domain for reservation purposes and for the benefit of certain individual Indians.

NEW RESERVATIONS IN ALASKA

The large influx of population into Alaska as a result of war activities, and the growing encroachment of the whites upon the land and resources of the Indians and Eskimos have served to emphasize the most serious problem confronting the natives—the protection of their ancestral hunting, trapping, and fishing bases. Recognizing the fundamental importance of the problem, the Office of Indian Affairs, early in the year, detailed a special representative to the Territory to supervise the work of establishing reservations.

Under authority of the act of May 1, 1936, six reservations were formally established in Alaska during the fiscal year 1944, as follows: Akutan, in the Aleutian Islands, area 72,000 acres; Karluk on Kodiak Island, 32,000 acres; Venetie, on the Upper Yukon, 1,408,000 acres; Shishmaref, 3,000 acres, and Wales 21,000 acres, both on Seward Peninsula.

Proposals for the creation of 16 additional reserves totaling 3,729,420 acres, have been received and are now under consideration. Two of the proposed reservations are located on the upper, and 1 on the lower, Tanana River; 2 are in southeastern, and 5 in central Alaska; 5 are along the Arctic coast; and 1 on the Noatak River.

LAND CONSOLIDATION

The absurd fragmentation of Indian estates under the allotment and inheritance system, resulting in great economic loss to the Indians and much unproductive administrative expense to the Government, has received further attention by the Sioux of South Dakota during the past year. The organization of the Tribal Land Enterprise by the Rosebud Sioux marks an encouraging advance toward the solution of this serious and complicated problem. The new organization's bylaws were approved by the Secretary of the Interior in December last, and its first "certificate of interest" was issued in January.

The purpose of the new enterprise, in keeping with the general Sioux land consolidation program, is to acquire individually owned allotments and fractional inherited interests in exchange for use rights in compact tribally owned areas thus established; also to purchase scattered interests and key tracts with tribal funds. Indians are coming to realize that only by such a method can the progressive, and otherwise ultimately ruinous, evil of fractional land ownership be ended. Already the Rosebud Tribal Land Enterprise has approximately 30,000 acres under its management, and there is a growing interest in the plan. The South Dakota projects are being watched by Indians elsewhere, and this movement to establish land ownership on a sound basis may well spread to many other allotted reservations of the western States.

LAND CONSERVATION

In the long view, the control of erosion on the home front must be regarded as secondary only to the successful conclusion of the war. Now that soil is being used more intensively than ever before, its fertility is being taxed to the limit. Accelerated erosion is destroying millions of acres of Indian land, in common with other lands throughout the nation.

The Indian Service has given increasing attention to aiding Indians in following conservation practices which will yield maximum production with a minimum of soil losses. During the war, with curtailed appropriations, such practices can be applied only in emergencies, to critical areas and to those which will most readily respond to treatment under the load of maximum production.

It has been fully demonstrated that the practice of scientific conservation on farm lands will increase yields by 20 percent, and in many instances by as much as 100 percent. The possibility of such increase has been demonstrated on the Florine Little Bear farm of 80 acres in Oklahoma. On this land the corn yield was increased from 100 to 360 bushels, hay from 20.5 to 38 tons, cotton from two to four bales, pasture carrying capacity from 48 to 63 animal-months.

THE RUINOUS COST OF SILTATION

The Salt River watershed in Arizona serves to reveal the values involved in the erosion and siltation problem of the West. At the present rate of siltation, the reservoirs of the Salt River Valley System will be completely silted full in 175 years. With this life expectancy it can be shown that the total annual loss resulting from reservoir sedimentation in this area is approximately a million dollars, or \$150 for each square mile of watershed.

The losses from siltation to downstream development in this area are greater each year than returns from the range and forest lands of the watershed. To these losses may be added large yearly damages from flood water. An amount equal to the losses to downstream developments, if applied for a 10-year period to the watershed, will reduce erosion and siltation to the minimum. Conclusive evidence on Navajo demonstration areas show that this can be done, with increasing returns to watershed users at the same time.

The Indian lands in the South and Southwest, comprising approximately one-half of all Indian lands, will require 111,400 man-years of unskilled labor, 31,650 man-years of skilled labor, 8,040 man-years of technical assistance, and 21,000 tractor-years to build the dams, terrace the fields, reseed the ranges, improve pastures, reconstitute cropping and cultural practices, stabilize stream banks, spread water, and do the other things necessary to preserve the soil and productivity of the upland farms and ranches, and to protect the downstream irrigation and public utility developments.

ACCOMPLISHMENTS IN 1944

The outstanding response of Indians to a program of conservation is attested by the fact that they spent in the past year for this purpose \$421,206 in terms of cash and contributed labor to supplement \$437,839 of Indian Office funds. The demand for assistance in preparing and carrying out conservation plans has been greater than the office could supply. Plans were requested on 544 land unit areas comprising 920,899 acres. Assistance in planning and establishing conservation practices was rendered on 330 units embracing 813,265 acres of Indian farm and range land, and erosion was checked in varying degrees on 536 farm units, comprising 206,266 acres.

Improved cropping practices were inaugurated on 53,047 acres, and drainage of 5,539 acres required 13 miles of ditching. Permanent farm pastures, totaling 10,000 acres, were established or improved. Worn out and badly gullied land, totaling 31,649 acres, was seeded to provide better soil cover and increased financial returns.

On the range land, improved management was instituted on 2,958,775 acres. The various activities undertaken to accomplish this in-

cluded the seeding of 17,518 acres, the contouring of 3,203 acres, the digging of 4,080 feet of drain canals, water spreading on 10,950 acres, the building of stock water tanks, and the development of wells and springs. Utilization checks, to learn the amount of forage being consumed and to determine the safe use of range, were made on 8,802,500 acres.

IRRIGATED LANDS AND POWER PROJECTS

Irrigation construction on Indian reservations was reduced to a minimum during the year in order to conserve materials for vital war projects, and only facilities for irrigating garden tracts were installed, noncritical materials being used. On lands already under irrigation, 37 internal distribution systems, comprising 10,000 acres, were revised to prevent waste and effect a more nearly uniform use of water.

During the year the irrigation projects of the Indian Service supplied water to 570,000 acres of farm lands on Indian reservations west of the Mississippi River. These lands, used by Indian and non-Indian farmers, have been devoted to increased production in keeping with the policy of the War Food Administration to emphasize maximum production in the area adjacent to shipping lanes for the Pacific war theater. Thus cross-country shipping facilities were conserved for other vital war materials. It is estimated that the combined farm crops raised on Indian irrigation projects during 1943 were sufficient to feed 10 Army divisions for a year. Forage crops were harvested for 300,000 head of beef cattle and 50,000 dairy cows.

Power systems, operated by the Indian Service along with irrigation projects, furnished 60 million kilowatt-hours of energy, directly and by inter-connection, to copper and molybdenum mines, manufacturing plants, city utilities, and other industrial and commercial consumers in the rural West. The San Carlos and Colorado River projects furnished irrigation water and power to relocation centers settled by 20,000 people of Japanese ancestry removed from the west coast and strategic defense areas. Power was furnished also to an army camp near Florence, Ariz., where prisoners of war are interned.

During the year, plans were developed for an impressive list of proposed irrigation projects on Indian reservations, to contribute to increased food production, to create post-war employment, and to make farms available for Indians returning from the armed services and industrial areas. On the San Carlos project, studies were made to prepare for post-war changes in commercial power loads.

MINERALS FOR WAR AND THE FUTURE

Will the petroleum and other mineral reserves on Indian lands be so depleted when peace comes as to render them insignificant in the post-war period? Not if the present exploratory activities, growing out of the Nation's war needs, meet with even a fair degree of success.

Already wartime discoveries of oil have been made on the Wind River Reservation in Wyoming, and on the Otoe and Pawnee lands of Oklahoma. Prospecting permits have been issued, with approval of tribal authorities, covering several hundred thousand acres in the Rocky Mountain region; and wildcat leasing blocks have been assembled on Indian lands in Montana, western Oklahoma, Mississippi, Wyoming, South Dakota, and New Mexico. Over a thousand oil and gas leases covering Indian lands have been approved during the past fiscal year.

QUAPAW RESERVATION MINES

Most gloomy of the predictions relating to post-war production of minerals from Indian lands have been concerned with the once-rich lead and zinc mines on the Quapaw reservation in the Tri-State mining district. But in spite of depletion of the richer ores, production from Indian lands within that district has borne up well. In the period from July 1, 1941, to June 30, 1943, the mines and tailing mills on restricted Indian lands of the Quapaw reservation sold 304,577 tons of lead and zinc, and the royalty received by restricted landowners from these sales amounted to nearly 2 million dollars. At the close of the fiscal year it was estimated that production for 1944 would equal that of the previous year.

Indian owners, the mining industry, the Geological Survey, and the Indian Service, are cooperating in arrangements to permit economical, unitized operations for the mining of lower grade ores and isolated high-cost ores. These arrangements and the industry's efforts to perfect improved methods for re-treating the ores and tailing piles may prove sufficient to prolong the productivity of the Quapaw mineral lands. Elsewhere in Oklahoma, prospecting permits, covering several thousand acres of Indian lands, have been approved in support of efforts to locate additional reserves of lead and zinc ores. In view of these activities, it seems probable that production of minerals from Indian lands will not decline in volume or importance during the war and for some time into the post-war period.

At present, leased Indian properties are producing minerals having an annual value in excess of 39 million dollars, yielding an annual income of nearly 6 million dollars in royalties to the Indian owners.

This estimate includes the total output of petroleum and its products, lead, zinc, copper, vanadium, helium, coal, tungsten, asbestos, manganese, gypsum, limestone, and marble.

COAL AND ASPHALT LANDS

The Choctaw and Chickasaw Nations once possessed lands encompassing many hundreds of square miles in the Southern States. Their last remaining communally held property, other than a few scattered tracts, consists of some 370,000 acres of coal deposits and about 3,000 acres of asphalt deposits that were segregated and reserved from allotment under the Atoka Agreement of 1898 and the supplemental agreement of 1902. A provision in the Interior Department Appropriation Act, approved June 28, 1944, paves the way for disposal of this last remaining property to the United States. The provision authorizes and directs the Secretary of the Interior to enter into a contract on behalf of the United States for the purchase of the lands and deposits. The contract is not to become effective unless ratified by the Indians in a referendum election, and then finally ratified by the Congress. The Principal Chief of the Choctaw Nation and the Governor of the Chickasaw Nation have indicated their desire to enter into the negotiations contemplated by the legislation, and plans for the negotiations are now receiving consideration.

INDIAN FORESTS

Based on a conservative estimate, there are approximately 35 billion feet of timber on about 16,700,000 acres of Indian lands in 19 states, 17 of which are located west of the Mississippi River. Of this volume approximately 80 percent is considered suitable for the production of lumber.

There have been active logging operations on many Indian reservations during the past year. The volume of timber cut for the production of lumber and other forest products was 502,867,000 feet. Since a very high percentage of the timber cut under contract went directly into military activities, the Indians and the Indian Service made every reasonable effort to furnish timber for cutting, consistent with sustained-yield management and available personnel. It is anticipated that the forests on Indian lands will continue to provide their full share of timber needed by the Nation during the war and post-war periods.

LUMBER ENTERPRISES OF INDIANS

During the past year the four Indian sawmill enterprises were operated with a reasonable degree of success. The volume of logs cut by each of these enterprises is as follows: Menominee Indian Mills, Neo-

pit, Wis., 18,337,000 feet; Red Lake Indian Mills, Redby, Minn., 5,360,000 feet; Navajo Indian Mills, Window Rock, Ariz., 7,718,000 feet; Fort Apache Sawmill, Whiteriver, Ariz., 1,008,000 feet. Limited available labor and equipment curtailed production to some extent. In addition to these sawmill enterprises, the Indians have carried on logging operations on their respective reservations.

FOREST DISEASE AND FIRE PROTECTION

The white pine blister rust continues to be a problem on Indian lands in the Lake States area. During the past year control work was done on 7,580 acres, in cooperation with the Bureau of Entomology and Plant Quarantine, Department of Agriculture. Indian women did much of the work.

The pine bark beetle caused some loss of ponderosa pine timber on Indian lands in the Western States last year. No control work was done because of the war. It is planned, however, as a post-war project, to do as much control work as conditions may warrant.

Fire protection on Indian forest and range lands continues to be a serious problem on account of limited funds and personnel. During the year, 976 fires burned over 166,058 acres of these lands, but none was excessively destructive, owing to favorable weather conditions. The average cost for fire suppression was one-half cent an acre for the 36,425,700 acres under protection.

GRAZING

Approximately 38,956,000 acres of Indian forest and range lands were used last calendar year for grazing approximately 355,770 cattle, 79,140 horses, and 1,299,720 sheep and goats. Of this total area, about 30,365,000 acres are being used by Indians to graze their livestock, and the remainder is being used by non-Indian stockmen under approved grazing permits.

Estimates of the grazing capacity of the Indian range lands have been made, and on most reservations the stocking has been limited in keeping with such estimates. Some districts of the Navajo, Hopi, Papago, and a few of the smaller reservations in the Southwest, continue to present a difficult problem with regard to overstocking. In all instances the problem is complicated by the fact that the Indians concerned depend largely upon a livestock economy, and do not own sufficient range lands on which to graze the number of livestock needed to maintain themselves on a reasonable economic level. Efforts are being made to correct this situation, and some progress was achieved during the past year.

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FISH AND WILDLIFE MANAGEMENT

The management of fish and wildlife resources on Indian lands was given considerable attention. The Fish and Wildlife Service has conducted special investigations on several reservations and has assisted in encouraging the Indians to adopt ordinances for the regulation of hunting, fishing, and trapping. The fish hatchery on the Fort Apache Reservation, Ariz., was successfully operated, and supplied fish for planting streams in that area. Fish from other sources were planted in waters on other Indian reservations.

ROAD BUILDING AND MAINTENANCE

Modern society cannot exist without adequate transportation. The roads constructed on Indian reservations during the last decade have contributed greatly to the ability of the Indians to expand their food production for war use. During the present emergency period, ordinary road activities are restricted to maintenance. The fact that construction organizations were equipped and available at the various reservations made it possible for the Indian Service to undertake the building of access roads to sources of raw materials, a program involving a cost of approximately 1 million dollars. This work is continuing. These access roads will be useful in the marketing of mineral and forest materials after the war.

Plans are being formulated for post-war construction to continue the development of reservation road systems, but a lack of funds has thus far prevented the making of field surveys and the preparations of blue prints and specifications. This is an essential step in meeting post-war responsibilities.

EDUCATION CONTRIBUTES TO WAR NEEDS

The mobilization of Indian resources, energy, and skills for the needs of the world conflict, has carried over into the educational realm with gratifying results. The effectiveness of the training offered in the Indian vocational schools, throughout the decade just ended, has been demonstrated by the rapid advancement of vocational school graduates to noncommissioned and technical grades in the armed forces, and by the large number of young men and women who have been employed in war work demanding high manual skill.

The great exodus of Indian families has reduced the number of students in both the elementary day schools and high schools by 2,200 from a total of 29,621 in the previous year. Although the total enrollment in Indian Service high schools has been reduced about 20 percent, as a result of the drafting and employment of older students, specialized training of a wide variety, which contributes to the success of the war, is being continued. Many high schools have given

courses in welding and metal work, suitable to the needs of the aircraft and shipbuilding industries.

The Navajo vocational schools have operated preinduction classes for illiterate and semiliterate Navajos, of whom there are a great many. Haskell Institute has offered special training for mature men in plant maintenance and engineering to replace younger employees of Indian schools, agencies, and hospitals, who have joined the armed forces. The commercial department at Haskell has found so great a demand for trained office workers in other branches of the Government that most of its students are now finding placement outside the Indian Service. Other schools have given special training for nursing and other especially needed skills.

Schools of the Indian Service are now planning the part they expect to play in the continued education and retraining of returning veterans under the provisions of the Servicemen's Readjustment Act; and Indian communities throughout the country have requested that we be equipped to undertake such training.

It is noteworthy that a considerable number of Indian students, granted Government loans for higher education, have continued or increased the payments on these loans since entering the armed forces, despite the legal moratorium they enjoy. The number of loan students, however, has been reduced from a previous maximum of 600 per year to 155.

INCREASING INTEREST IN EDUCATION

Increasing interest in education upon the part of Indians themselves has been evidenced by the fact that a number of tribal councils have passed compulsory education ordinances, and enforced such ordinances previously enacted but neglected.

The Navajo Tribal Council has called upon the Indian Service to provide additional schools, asserting that the Government is not carrying out its treaty agreement to supply a classroom and a teacher for each 30 Navajo children presented for enrollment. Also the Council has asked that a high priority be given in post-war planning to the additional boarding and day schools needed for 10,000 Navajo children not now enrolled in any school.

Indian communities have been encouraged to take an increasingly active part in planning for their school children and in outlining a program of post-war development for serving different age groups. The discussions which occurred during the year revealed an almost unanimous enthusiasm for the Federal school program in the closed reservations, to which it is now largely limited.

Research in Indian education has been supplemented by initiating a study of achievement in elementary and high schools, and it is hoped

that an initial report on the effectiveness of Indian schools in achieving their objectives may be presented within the coming year.

The annual Indian Service summer school, primarily for the in-service training of employees of the Education Division, has for the last 2 years been oriented towards war and post-war problems, encouraging a consideration of revised vocational curricula in the light of post-war needs. New teachers have found the summer school most effective as an introduction to the program of Indian education.

EXTENSION WORK

The diminution of Extension funds resulted during the year in the withdrawal of Extension positions on several reservations, such as Eastern Cherokee and Mississippi Choctaw. In such areas the day school teachers and vocational instructors attached to the schools undertook to carry on a program of advice and guidance in agriculture, stockraising, and home extension with the adult Indians. At the day schools on these and other reservations, the Education Division has assigned purebred sires to assist in improving the beef cattle, horses, and other livestock of the reservations. Several years ago, a decision to undertake the up-grading of dual purpose beef and dairy cattle at Eastern Cherokee led to the purchase for the day schools of registered brown Swiss bulls, whose offsprings are now affording better milk and more meat. At the day schools of the Pine Ridge and other Dakota reservations, purebred Morgan stallions are improving Indian cattle horses.

All Home Extension work on reservations with Federal schools is being handled by the day school teachers and housekeepers under the direction of the home economics teachers of the central vocational schools. Home economics equipment is made available for use by adults, and instruction is offered them in sewing, also in cooking by way of increasing their concern over the use of an adequate variety of nutritious foods within the home.

INDIAN ARTS AND CRAFTS

During the past year Indian craft centers have enjoyed a greater demand for craft products than at any previous time. While a great many of the younger craft workers have been away from the reservations, the earnest efforts of craft teachers and the sponsorship of co-operative producing and distributing centers have led, in many cases, to an actual increase in crafts produced and sold. For example, the Northern Plains Indians Crafts Association, which is the outlet for producer cooperatives among the Indian craft workers of the Montana and Wyoming reservations, increased its business from \$6,906.87 in the calendar year 1942, to \$11,135.30 in 1943.

During the same period of time, the sales of Alaskan native crafts increased from \$242,100.67 to \$420,201.18. The latter increase, however, was more a matter of higher prices than of quantity sold, owing to the patronage of American troops stationed in the Territory.

The foundation has been laid for a considerable expansion of craft production in all the major Indian areas after the war. Recently, the Indian Arts and Crafts Board has copyrighted trade-marks for the Navajo Crafts Guild, the Seminole Crafts, and Northern Plains Indians Crafts Association. Copyrights of trade-marks for other producing and marketing groups are pending.

INDIANS ORGANIZE FOR HEALTH

One of the more encouraging developments of the year has been the increasing participation of Indian communities in the health activities of the Indian Service. Health councils were organized by the Indians on a number of reservations, and these are now functioning with marked enthusiasm for the task confronting them. In one instance a salaried board of health, the membership of which is entirely Indian, has been established. Such councils, in collaboration with health personnel and the superintendent of the agency, formulate modern health programs, recommend health legislation to their communities, and assist in presenting approved health policies and practices to their people in such a way as to stimulate interest and win acceptance.

Numerous ordinances, providing for the control of communicable diseases, have been passed by the health councils and approved by the tribes. This democratic approach to Indian health problems is highly significant, and there are indications that the movement will spread to other reservations during the coming year.

SHORTAGE OF HEALTH PERSONNEL

The growing determination of Indians to do something about their own health problems is especially desirable in view of the critical shortage of health personnel. On January 1 of this year, there were 73 vacancies for full-time physicians, 27 for part-time physicians, and 188 for nurses. Some of these vacancies are filled by local temporary employment, so that, in most instances, the essential emergency services are still available.

Cadet Nurses are being assigned to Indian hospitals, with benefit to all concerned; and the facilities thus given to their training is a direct contribution to the war program. Arrangements have been completed for the affiliation of the new Tacoma Hospital with the School of Nursing at the University of Washington.

Indian technicians and orderlies are being trained by Indian Service physicians and nurses to take the places of those now serving in the armed forces and to relieve medical personnel for more important duties.

HEALTH SERVICES OF THE YEAR

Exact tabulation of health service statistics for the fiscal year has not been completed, but the trend has not varied greatly from that of the preceding year. At that time the 94 hospitals operated by the Indian Service in the States and Alaska had 3,255 beds available for general cases and 1,214 for tuberculosis; 40,184 patients were admitted to the general hospitals for a total of 968,993 hospital days, and in addition, there were 4,739 tuberculosis patients given 393,859 days care.

Considerable hospital care has been furnished to families of soldiers and sailors, in cooperation with the Maternal and Child Care Program of the Children's Bureau. The intensive campaign to control and eradicate trachoma has continued, and during the year 2,232 cases were reported by the hospitals. The Bacillus Calmette Guerin or B. C. G. vaccination research project for the control of tuberculosis was carried on under extreme difficulties; but progress continued, and several reservations have reported 100 percent of known cases hospitalized.

Health conditions in Alaska, emphasized by the presence of war workers and the military, have been of great concern. At the close of the fiscal year, the Congress approved the transfer of a 150-bed hospital at Skagway from the Army to the Indian Service. If the necessary personnel can be obtained, the operation of this facility will contribute in large measure to the control of tuberculosis among a highly susceptible people.

The most notable innovation by the Indian health service during the year was the beginning of a complete analysis of vital statistics to determine accurately the Indian population served, birth and death rates, age distribution, causes of death and of morbidity, hospital utilization, economic status with its many implications, and other matters necessary for efficient employment of funds and efforts. When the analysis is completed it should prove of great practical value to the various branches of the Indian Service.

WELFARE ACTIVITIES

Especial emphasis was placed upon a more constructive welfare program, beginning with aid to adult Indians in taking advantage of opportunities offered by the defense industries, and featuring preventive and protective care for children, adolescents, the aged, and the incapacitated. Perhaps the greatest advancement in relief work

during the past year has been in the substitution of cash assistance for rations.

There has been a continuing effort to gain full recognition of the Indians as citizens of their home counties and States, with the responsibilities as well as the privileges of other citizens. It is good to note that the State of Colorado, on January 1 last, began issuing assistance under the Social Security Act to needy Indians of the Consolidated Ute Reservation. Efforts are being made to have the Sac and Fox Indians of Iowa included in the State aid to dependent children program.

As throughout the Nation, there has been a considerable increase in juvenile delinquency, and in other problems traceable to faulty adjustments away from home, as well as in families disrupted by the absence of the father. Our program is planned to meet such situations, continuing to stress adequate aid for the needy, wholesome recreation for the whole family, and particularly for adolescents. Careful attention is being given to the needs of returning servicemen and defense workers.

AWARDS OF EXCELLENCE

Four Indian Service employees, Mr. and Mrs. C. Foster Jones and Mr. and Mrs. Charles Ralph Magee, received awards of excellence and meritorious promotions voted by the Interior Department's Board of Suggestions. Mr. and Mrs. Jones, radio operator and teacher, respectively, on the island of Attu in the Aleutians, remained courageously at their posts after war was declared; and when Attu was taken by the Japanese in June 1942 they either became prisoners of war or lost their lives resisting the enemy. When Attu was retaken no trace of them was found and no word has been received from them, but it is hoped that they are alive and will return to their work after the war is over. Mr. and Mrs. Magee, holding similar positions on Atka, managed by heroic measures to evacuate the population of the island without loss just before the arrival of the Japanese, and they accompanied the Aleuts to temporary homes on the mainland.

HOONAH VILLAGE BURNED

Fire broke out in Hoonah Village, Alaska, on the evening of June 14, when, according to reports, an Indian woman who was drying fish in a little stilt-supported house threw gasoline on the embers of her fire. A high wind spread the flames rapidly and about 70 percent of the village was destroyed, leaving 350 persons homeless. One man lost his life. Coast Guard officers flew to the scene, and the Army, at the request of Indian Service officials, evacuated many of the homeless to Excursion Inlet, where barracks were available for

temporary shelter. The Red Cross, through the Sitka, Juneau, and Kechikan chapters, sent food and blankets. Planning was begun at once by the Indian Service, in cooperation with other Government agencies and the Army, for rebuilding and resettling the village.

TRIBAL CLAIMS

One of the important objectives to be obtained in the post-war period is the early settlement of Indian tribal claims against the United States, which, for patriotic reasons, have not been pressed during the war.

The Indians look forward to the settlement of their claims as a means for their economic advancement in the post-war period. The proceeds from favorable judgments will be used largely to acquire additional needed land, to build homes, and to develop land enterprises. Consonant with this plan, legislation has been enacted to enable the Menominee Indians to acquire reservation lands in Wisconsin from the proceeds of the judgment rendered by the United States Court of Claims last February. Negotiations are being made for settlement of the claims of the California Indians by an appropriation to be used during the post-war period for the economic advancement of these Indians.

The establishment of an Indian Claims Commission would relieve the Congress of the burden of considering each claim at a time when other matters of great moment will require attention. Also, such a commission would relieve the Court of Claims at a time when doubtless it will be overburdened with litigation. The Indian office has urged the creation of such a commission, and will continue to do so.

INTER-AMERICAN ACTIVITIES

In Mexico City, on April 18, 1944, the governing board of the Inter-American Institute of the Indian held its annual meeting, exactly 4 years after the first great Congress of the Indians at Patzcuaro, Mexico. Twelve republics have now united themselves with the Institute through treaty. They are: Mexico, El Salvador, Panama, Honduras, Nicaragua, Ecuador, Colombia, Peru, Costa Rica, Paraguay, the Dominican Republic, and the United States. Others are preparing to join in the movement. At the annual meeting, particular attention was given to the project of the National Indian Institutes of Panama, Nicaragua, and Ecuador, cooperating through the Inter-American Institute with the National Indian Institute of the United States, for the establishment of health work at the subprofessional level. This project includes a study of the feasibility of uniting modern health work with the work of native medicine men, and the organization of subprofessional health services in the necessary absence of a sufficient supply of doctors and nurses.

Attention was given, also, to the Indian personality project, carried out under the Inter-American Institute in Mexico. This project has been successful in using the services of many types of professional and lay workers, including Indians, and promises to be deeply revealing on both the administrative and psychological levels. It is an integrative study, paralleling that now going forward in our own Indian Service.

On Indian Day, the purposes and hopes of the Institute were broadcast throughout Mexico, Central America, and northern South America, through speeches by Dr. Manuel Gamio, Director of the Institute, Senor Isidro Candia, the Director of the Indian Service of Mexico, and Commissioner Collier, who had been reelected as chairman of the governing board.

MISSION TO EL SALVADOR

During his visit to El Salvador last summer, Mr. Ernest E. Maes, Secretary of the National Indian Institute, was much impressed with the program set up there by the Confederation of Rural Credit Funds. As our Indian Service has been greatly interested in developing a self-liquidating agricultural system for Indian farmers, Mr. Maes felt that someone should be sent to El Salvador for the purpose of studying the program there in operation.

Mr. David C. Dozier, a young Santa Clara Pueblo Indian employed at the United Pueblos Agency in Albuquerque, was chosen for the mission, which he performed during February with profit to all concerned. In sending Mr. Dozier on this mission, the National Indian Institute was fulfilling its function of developing collaboration among Latin-American countries and our own country in the solution of Indian problems.

LOOKING TO THE FUTURE

The fiscal year 1943 marked the end of 11 years during which there had been a tremendous release of long-dormant Indian energy, a vigorous functioning of inherent Indian democracy, and a rebuilding of the shrunken Indian landed estate. It was necessary to know how much progress Indians had made during those 10 years in the direction of democratic self-control and economic self-sufficiency, and what might best be done to safeguard and improve Indian organization and economy for the trying test of the post-war period.

For 2 years research, designed in its end result to criticize and implement policy and administration in Indian Service, has gone forward in 11 contrasting communities in 5 contrasting tribes. The Committee on Human Development, of the University of Chicago, and specialists from a number of other institutions, have contributed indispensably. These studies have used integratively the instruments

of discovery of anthropology, psychology, ecology, and so on. The initial results are now in process of publication or ready for publication. Information acquired by these studies and the practical experience of Indian Service administrators, augmented by consultation with experts in personnel and public administration, will be made available in the coming months to produce critiques of Indian administration which will well may prove far reaching and practicable for the better administration of native groups.

These intensive researches and their practical utilization are concurrent with the production, service-wide but less intensive, of practically based post-war plans by the Service personnel and the Indians in all jurisdictions of the Service. Early in the fiscal year 1946 Indians and field employees were requested to review past accomplishments and present conditions; to analyze the social, economic, political, and administrative problems of each tribe or group; and on the basis of such an analysis to consider the future relations of the tribe or group to the Federal Government, to the States and Territories, and to the non-Indian population.

It was realized that the basic resources of nearly all tribes were inadequate; that the enlargement of resources and their effective utilization by Indians presented many difficult problems; and that the formation of the reorganized tribes as civic or corporate bodies was a matter of much improvement.

In response to this call of a year ago for the gathering and interpretation of facts, opinions, and suggestions, 64 detailed proposed post-war programs, dealing with the problems of 120 tribes and groups, have been submitted. These proposed programs are now being carefully analyzed and revised. Upon approval in the proper forms, they will serve as maps whereby the Indian tribes and groups concerned, in cooperation with the Department and with the aid of the Congress, can determine definite courses which will lead to the common goal of self-sufficiency and harmonious integration with the national life.

Division of Territories And Island Possessions

BENJAMIN W. THORON, Director



THE magnificent accomplishments of the armed forces in freeing Alaska of the Japanese invaders, relieving Hawaii of the probability of attack, and virtually clearing the Caribbean area of the submarine menace, point to the necessity for developing a post-war program by the Division of Territories and Island Possessions. It has, however, been unable to make much progress because of the reduction of its appropriation necessitating reduction in staff at a time when many new problems must be met. The action of Congress in still further reducing the 1945 budget leaves the Division in a desperate situation.

The Division of Territories has been keenly aware that the position of Alaska is one of national strategic importance. Public interest has been greatly stimulated as a result of war activities, the building of the Alaska Highway, and various articles in the press and magazines. As a consequence, inquiries from servicemen and civilians relative to post-war opportunities have flooded the Division. In cooperation with the General Land Office and other bureaus an effort has been made to supply information that is factual and will be helpful to settlers desiring to build their future on the new frontier. The development of an Alaskan program by coordinating the work of the various bureaus within the Department is essential and the Division has tried to make a start on this. Hospitals for the treatment of tuberculosis among both white and native populations are urgently needed. Negotiations are now under way to have the military facilities which are no longer considered necessary for the treatment of war casualties, transferred for the use of the civilian population. The disposition of other surplus military property and equipment to Federal and territorial civilian agencies can be of great permanent value, where its sale

to dealers and speculators for cash as salvage will lead to much greater Federal expenditure in the future.

The Alaska Railroad continues to do heavy duty for military and civilian needs. In spite of manpower shortages and difficulty in securing equipment, every effort has been made to improve the roadbed, bridges, and rolling stock. The Division has worked in close cooperation with the War Manpower Commission and the War Department to recruit help, and with the Office of Defense Transportation and the War Production Board to secure priorities for materials and equipment.

Since the changed military situation in Alaska during the summer of 1943, the need for governmental stockpiles of food for civilians no longer exists. Liquidation of these stocks has been proceeding in an orderly and businesslike manner, through sales to the trade, other agencies, and to the Army and Navy, and is rapidly nearing completion.

The Morningside Hospital at Portland, Oreg., where insane residents of Alaska are cared for, was inspected, and conditions were found to be satisfactory.

The position of Hawaii has changed from a defense outpost to a base for offense. As a springboard for the South Pacific, it still has all of the problems of a war theater. Civilians feel the pinch of housing and shipping shortages. Although martial law remained in force, conferences were held between this Department and the War, Navy, and Justice Departments, looking to the complete restoration of civil affairs to civil authorities and some relaxations of military controls were obtained. The validity of the trial of civilians by provost courts was challenged in the Federal District Court. Both Federal judges ruled against the military, and appeals were taken to the Circuit Court of Appeals at San Francisco, but had not been argued by the end of the year.¹

The Division, working in cooperation with the Hawaiian Housing Authority, was successful in securing an interim housing program providing for 250 publicly financed dwelling units and 500 privately financed dwelling units. This allotment was predicated largely on the availability of manpower and matériel. While it does not begin to meet the need, we hope that a more extensive program may be undertaken in the coming year. The Territorial Office of Civilian Defense, which has done an outstanding job in instructing civilians in all phases of defense activities, has discontinued many of its branches. However, it maintains a skeleton force and its employees, both paid and voluntary, demonstrated their training in a recent serious explosion and plane crash. By rigid control of expenditures it still

¹ By proclamation of the President dated October 19, 1944, martial law was terminated and the privilege of the writ of habeas corpus was restored, effective October 24, 1944.

retained a sufficient balance of the appropriation made in January 1942 to carry through the 1945 fiscal year.

Of outstanding interest and importance to the possible future relationship between Puerto Rico and the continental United States was the meeting of the President's Advisory Committee to draft recommendations for revising the Island's Organic Act with a view to granting to the people an increased measure of control over their local affairs, including the popular election of their Governor. The committee consisting of four Puerto Ricans and four continentals under the chairmanship of the Secretary of the Interior met in Washington for 3 weeks in July and August and drafted a bill providing for election of the Governor by the people, appointment of the justices of the Supreme Court and of all department heads by the Governor, together with other amendments to the Organic Act consistent with these provisions and increasing local self-government. The bill was transmitted by the President to Congress. It passed the Senate with numerous amendments, but has not yet been taken up by the Insular Affairs Committee of the House of Representatives.

The Civilian Food Reserve unit of the Division of Territories, working with the Office of Distribution of the War Food Administration, during the year procured and shipped to Puerto Rico and to the Virgin Islands a total of 479,715 tons of foodstuffs, feeds, and fertilizers. There were ample supplies of basic commodities and the prices during the year were stabilized in a very satisfactory manner.

In line with our expressed policy after discussion with our Trade Advisory Committee, 41 food and feed commodities, involving approximately 8,000 tons monthly, were returned from governmental procurement to the regular trade channels. The return of additional commodities is being made as rapidly as there is assurance that adequate supplies can be maintained at reasonable prices.

While shipping to Puerto Rico was still severely restricted, the supply situation was met satisfactorily, considering the prevailing wartime conditions, through the continuance of governmental control of shipping space as described in last year's report.

The complete lack of war industries in Puerto Rico, the cessation of military construction, a severe drought that reduced sugar production materially, and the discontinuance of the work relief program of the Federal Works Agency all aggravated the Island's unemployment problem. The Insular Government immediately appropriated funds for direct and work relief. Induction into the armed services of more than 25,000 men also helped to relieve conditions. The Division assisted in working out plans in conjunction with the War Manpower Commission and the Governor's office to bring several thousand Puerto Ricans to the mainland to relieve the manpower shortage in war industries. The War Manpower Commission did not obtain the neces-

sary appropriation to finance their transportation, but over 2,500 Puerto Ricans have come, some paying their own way and seeking employment individually, others transported at the expense of employers who contracted for their services through the War Manpower Commission.

Steady progress is being made by the Puerto Rico Development Co. in the introduction of new industries to supplement the Island's agricultural economy. Private interests are constructing a coconut fiber bag plant, and a leather goods manufacturer has begun operations in the west end of the Island. Continental industrialists are showing increased interest in the Island. The Division and the Development Co. have not only aided those firms which have begun operations in the past year but have encouraged those who are looking to the Island as a possible post-war base for branch plants in which to manufacture goods for South and Central American trade.

During the year the President issued an Executive order which places on the Secretary of the Interior responsibility for coordinating the policies and activities of all Federal civil agencies in Puerto Rico and the Virgin Islands. Most of the agencies have cooperated effectively with the Division of Territories with a resultant improvement in the services provided in the Islands. The reduced appropriation for personnel in the Division has made it impossible to make this coordination fully effective.

In the fiscal year full or partial settlements have been received or agreements reached in 530 cases of hurricane relief loans, with collections totaling \$135,835.05, as compared with a total of 852 adjusted in the preceding 4 years. New procedures have been instituted to expedite the settlement of these loans. Small debts of farmers living in isolated mountain areas have been handled expeditiously through the Agricultural Extension Service of the University of Puerto Rico.

The need for molasses for munitions production made it necessary for the War Production Board to establish quotas for the importation of beverage cane spirits from foreign countries and for the production of the same product in American Caribbean possessions. The Division energetically presented the case for Puerto Rico and the Virgin Islands at conferences of the interested agencies. The resulting quotas, while not fully satisfactory, have permitted the operation of the distilling industry in these islands at something less than 50 percent of capacity. The effect on the revenues and employment will be very noticeable in the coming fiscal year unless the restrictions are removed.

The failure of Congress to appropriate the salary of a Government Secretary for the Virgin Islands, upon which office the Governor's duties devolve in his absence, resulted in that position remaining vacant from the time of the resignation of Robert Morss Lovett. This has resulted in an enormous burden on the small administrative staff

of the Virgin Islands Government and the restoration of this position is essential. After the Federal Works Agency work program was liquidated at the end of November 1943, a bill was introduced in Congress containing a program of specified public works. Hearings have been held by the House Committee on Insular Affairs but no further action has been taken.

The Virgin Islands Co. enjoyed a prosperous year. The Bethlehem sugar factory, which had been rehabilitated with Public Works Administration funds, was put in full operation for the first time in 14 years and 33,200 tons of sugarcane were ground. It is expected that the operation of this mill will bring about increased cane planting and so add to the income of the small farmers of the islands.

As a result of the responsibility of the Department for matters affecting Puerto Rico and the Virgin Islands, the Division has participated actively in the work of the Anglo-American Caribbean Commission. Puerto Rico and the Virgin Islands were represented by their own delegates at the first West Indian Conference held at Barbados, March 21-30. The Director also attended as an adviser to the American Commissioners. The interchange of information and ideas among the people and officials of the various islands may well lead to a better understanding of the community of their problems and to trade relationships that will be extremely beneficial to the whole area.

Although the Philippines are still under enemy control, concern for their future is evidenced by the approval in November 1943 of a bill relating to their rehabilitation, a joint resolution of Congress relative to the establishment of an independent government after the enemy has been driven out and the approval of a joint rehabilitation commission to study and make recommendations on post-war problems. Certain fiscal responsibilities continued to be exercised by the Division, but because of the failure of Congress to appropriate funds it was not possible to make any constructive preparation for the time when the Commonwealth Government returns to the islands.

A more detailed report of activities in each area follows:

TERRITORY OF ALASKA

Although the last Japanese on Alaskan soil was exterminated or had fled in the summer of 1943, Alaska still retained on June 30, 1944, its status as a combat area. What military activity there was, however, had been transferred to the Aleutian chain. Civilian travel control, censorship, and other military restrictions still remained.

Recognition of the present and future military importance of Alaska has come with the establishment by the Army of the Alaskan Department to supersede the former Alaska Defense Command, commanded from San Francisco, and establishment by the Navy of the Seventeenth

Naval District to supersede the Alaska Sector of the Thirteenth Naval District, commanded from Seattle. Both of these new commands have their headquarters in Alaska.

A similar recognition of Alaska's importance and of its special character in a different field—and one of the greatest economic importance—came with the establishment of the Territory as region 6 of the Fish and Wildlife Service under its own Regional Director with headquarters at Juneau. Under the Regional Director, a fishery management supervisor and a game management supervisor superintend the vast natural resources in their respective fields.

The establishment of an Alaska regional office in Anchorage of the Civil Aeronautics Board is likewise a recognition of the great importance and potential growth of civil aviation in the Territory.

In the War-bond drive Alaska maintained its record of surpassing its quotas and of leading the Nation. In the Fourth War Loan, Alaska raised 202 percent of its quota. In second place was the other Pacific Territory, Hawaii, with 175 percent. This record is all the more striking since, while Alaska was the only political entity to subscribe more than double its quota, only two States exceeded their quotas by as much as 50 percent.

Although the Territory had made no provision up to the end of the fiscal year for a planning or development commission to formulate a post-war construction program, both to meet the Territory's needs and to provide for the returning veterans, a start has been made by the Governor's office which has requested individual communities to study their needs and to submit desired projects with approximate cost estimates. To date requests for projects totaling \$23,050,500 have been received from the following Alaska towns: Anchorage, Craig, Cordova, Douglas, Fairbanks, Haines, Juneau, Kodiak, Ketchikan, Nome, Petersburg, Sitka, Skagway, Seward, Unalaska, Valdez, Wrangell, and Whittier. Estimated costs for post-war projects submitted thus far by Territorial and Federal agencies total \$36,434,625. These estimates have been submitted by The Alaska Railroad, the Alaska Road Commission, the Forest Service, the Fish and Wildlife Service, the Office of Indian Affairs, the Public Roads Administration, the Territorial Department of Education, the Territorial Department of Health, the University of Alaska, the Department of Justice and the Post Office Department. Post-war planning for Alaska is, however, far behind what it should be, especially in comparison with other political units—virtually every State in the Union having long since established its planning and development commissions.

While war continues to be, in Alaska, as elsewhere under the flag, the overshadowing fact, Alaskans have in the last year become acutely and increasingly aware of another insidious enemy within. It is the "White Plague." The incidence of tuberculosis has long been high in

Alaska, approximately twice that in the 48 States, with correspondingly high mortality. Apparently the disease is on the increase. The last, the Sixteenth Territorial Legislature was the first to indicate the awakening local interest in this peril by appropriating \$25,000 for the Territorial Department of Health for the hospitalization of tubercular patients. But since the health authorities estimate that there are at least 2,000 active cases in the Territory that require hospitalization—for only 5 percent of which hospital beds are available—this is only “a drop in the bucket.” Efforts during the last year to secure the construction with Federal funds of additional hospitals for tuberculosis have failed, because new construction requires military endorsement. Attempts to secure from the Alaskan Department of the Army one or more of the various new hospitals constructed for war purposes and closed as the military situation changed and the war moved westward, were likewise unsuccessful. Fortunately, however, the Northwest Service Command, which had jurisdiction over a small portion of southeastern Alaska, took a different attitude and was agreeable to the transfer of the abandoned military hospital at Skagway for the purpose. At the close of the fiscal year authority was obtained for the transfer of that hospital to this Department and an appropriation was made by Congress to finance the operation of the hospital for native tuberculosis patients, at least until the next Territorial Legislature, convening in 1945, could determine its desires and responsibilities in the matter, and make provision for operation of the hospital for all civilian tuberculosis sufferers.

THE ALASKA ROAD COMMISSION

The Alaska Road Commission has worked under difficulties due to shortage of labor and equipment but it has succeeded in keeping the main highways in passable condition to meet civilian as well as military traffic demands. The Glenn Highway was kept open throughout the winter. Maintenance work on the Alaska portion of the Alaska Highway was transferred from the Army to the Road Commission at the close of the year.

Reconstruction and improvement work on the Richardson Highway, necessary to make it suitable for the heavy truck traffic to which it was subjected was continued to the limit of available funds. Several new steel spans were substituted for weak and inadequate wooden bridges and trestles. No new mileage was constructed.

ALASKA RURAL REHABILITATION CORPORATION

The Matanuska Valley project has shown notable improvement. The total area of cleared land is over 6,000 acres, of which 4,000 are in cultivation. The Army and increased civilian population of central Alaska have created good markets for all products of the valley.

The farmer's cooperative is now supplying all of the fresh milk cream used in Anchorage and is in sound financial condition. Several of the original colonists have paid their indebtedness in full. Repayments generally are more satisfactory than formerly. With approval of the Secretary of the Interior, the Board of Directors is to eliminate all restrictions contained in land contracts when final payment is received and to issue fee simple deeds. Several tracts reclaimed by or repossessed from original purchasers have been sold to settlers. The Matanuska Colony is well on the road to becoming a thriving community of hard working, successful farmers and stock makers, fully justifying the sponsorship of the project by the Federal Government. Agricultural development in the Kenai Peninsula and in the Tanana Valley is also showing progress.

THE ALASKA RAILROAD

Operations of the Alaska Railroad were the most successful in its history. For the second successive year, the volume of both freight and passenger traffic exceeded all previous records. Net tonnage and revenue freight carried were more than four and one-half times the volume in 1939, and passenger miles were more than twice the volume in 1939, the last year before war activities affected transportation.

Shortage of skilled manpower continued as the most serious operating problem throughout the year. The Railway Operating Battalion loaned by the War Department on a reimbursable basis, continued to render valuable assistance throughout the year. Nevertheless, the railroad was handicapped by a continuing shortage of qualified personnel, especially in its repair shops at Anchorage. Strong efforts were continued throughout the year, with assistance of the Alaska Department of the Army and the United States Employment Service to recruit civilian personnel in the States. The results of these activities have been only partially successful. A comparable situation prevailed in Alaska's coal mines. However, the Eskimo operated by the railroad, produced 67,300 tons of coal.

New construction included an addition to the Anchorage engine house, a new engine house at Fairbanks, and extensions to sidings at a number of stations, totaling approximately 13,000 feet. An extensive tie renewal program was carried on throughout the year and extensive ballasting was undertaken on the Whittier line and at other points. Efforts to improve the standard of maintenance were, however, limited by shortage of manpower.

To provide adequate wartime transportation it was necessary to purchase much additional rolling stock and equipment, most of which unfortunately had to be second-hand.

The Whittier Cut-Off has been in full operation throughout the year with the result that the railroad has been able to handle a large

increase in the volume of freight traffic without a corresponding increase in existing equipment and with approximately the same number of employees. Two new Diesel locomotives were purchased for operation on the Anchorage-Whittier line in lieu of providing forced draft ventilating systems in the tunnels necessary for operation of steam locomotives. Many of the terminal facilities at Whittier were completed and turned over to the railroad for operation.

River boat service on the Yukon and Tanana Rivers was maintained throughout the summer season. The river fleet was augmented by the transfer from the War Department of the steamer *Barry K*, and the loan of two barges. Also a new 300-ton barge was completed and placed in service. The amount of river freight handled increased approximately 10 percent, totaling 15,412 tons.

The McKinley Park Hotel was not operated by the railroad, as it has been turned over to the Army for the duration of the war as a recreation center for the Alaskan Department. Groups of officers and men from outlying posts are given the opportunity of spending a week's leave at the park.

TERRITORY OF HAWAII

During the fiscal year Hawaii continued to accommodate all of its governmental and its commercial and industrial facilities to the maintenance of internal security and to the military effort centered in these islands. Planning for the future necessarily has been subordinated, but it has not been neglected.

The Governor established a post-war planning division of the Department of Public Works and an advisory board to assist this division. This agency is coordinating all other local efforts to formulate plans and policies involving the development of Hawaii's natural and human resources and the expansion of its facilities to the highest attainable degree of usefulness to itself and to the Nation.

The operating experience of agencies created under the Governor's emergency powers to meet war-created problems has provided a record which should be of great value in establishing future legislative policies. Citizens, trained as wardens and as auxiliary police and fire-fighters and defense corps, are unified and alert to the requirements of community safety.

The problems which have had to be surmounted in connection with the control and development of food production and importation, and the procurement locally and from the mainland of other essential civilian commodities, have emphasized our dependence upon regular trans-Pacific shipping facilities and the necessity for future expansion of local production for local use.

Widespread development of community interest in mosquito and rodent control and in other public health security measures fostered

by the various territorial, Federal and municipal agencies involved, will pay dividends for years to come. Dengue fever, which became epidemic about the beginning of the fiscal year, was under control at its end. The disease was probably brought here from the western Pacific, which emphasizes the necessity for the intensification of protective measures (including embargoes against and quarantine of animals) designed to prevent airborne passenger and freight transport from bringing to Hawaii or to the continent human or other diseases which are prevalent in areas to our west.

Two new public health centers, constructed with Federal funds, were opened during the year. Lanham Act funds also helped to provide additions to Hawaii's general and mental hospitalization facilities. At least one of the hospitals established as part of the emergency medical service will remain as a community asset at the end of the war. Plans exist to continue the emergency blood bank on a permanent basis. Compulsory "booster" injections of typhoid vaccine, the second since Pearl Harbor, provided immunization which should tend to keep down this disease in the future.

Construction had started on two new refuse incinerators in Honolulu, partly financed with Federal funds, and the municipal government was in the midst of a survey of sewerage requirements which should, prior to the war's end, produce final plans for the complete sewerage of Hawaii's capital city.

Some progress was made toward solution of the continuing acute housing problem and efforts are continuing. All agencies concerned are endeavoring to tie in relief of current conditions with post-war plans for slum clearance and orderly community development.

All major territorial seaports and harbor facilities and all airports continue to be operated under the direction of the military authorities, but payment for the use of territorial wharves is now being made by the Army and Navy. Extensive reconstruction and repair of harbor facilities will be necessary at the war's end. Substantial improvements have been made to major airports by the armed forces. Plans for continuation of these improvements are being prepared. Highway maintenance; i. e., prevention of total disintegration, continued to be a major problem and reconstruction will afford a major source of post-war employment if efforts to secure war damage reimbursement are successful. The Territorial government urges strongly that since the deterioration of the highways is due to their use by vehicles of the armed forces of a weight and character for which they were not built, those services should be obliged to finance their reconstruction. New construction, except for the Pearl Harbor Road, was confined to military access roads financed by Federal funds.

Large park and other recreational areas are still devoted to active military use. Plans are ready for coordinating the extensive restora-

tion work which will be necessary with further improvement and extension of these areas.

Hawaii's teen-age citizens again cheerfully assisted in the production of its vital crops. Retail and other business remained at a relatively high level in spite of acute manpower shortages and continued curtailment of shipping space. Tax collections, both Federal and local, and bank deposits and postal receipts increased over the previous year. Territorial and county bonded indebtedness is being reduced, which will increase post-war borrowing capacity. Previously established rationing and price control procedures continued to be effective. Control of commercial rents was effected by a Defense Act rule.

Territorial, municipal, and Federal departments and agencies, as well as the post-war planning division and certain committees, are formulating plans for the reassimilation into Hawaii's economy of her returning servicemen.

Administration of Hawaii's civilian affairs by civilian agencies, existing under the authority of law, was further extended during the year.

PUERTO RICO

The year has seen the tides of war recede from Puerto Rico but the effects of the crucial danger period of 1942 are still noticeable. In spite of this it is not possible to relax in vigilance as Puerto Rico's life blood flows through arteries of ships. So long as the war is on, the possibility of the diversion of ships for our invasion needs or of a final desperate attempt by the enemy to destroy our commerce through a renewed submarine campaign, necessitates Puerto Rican preparedness to keep its people from starvation.

Unlike the continental United States, the war has brought little benefit to the people of Puerto Rico with the exception of increased revenues from rum. Even this has been a mixed blessing as it has been used as a reason for reducing Federal aid to the Island and for proposals to change the fiscal relationships that have existed for over 40 years. The Federal Works Agency liquidated its work relief program on the island on November 30, 1943, and the Insular War Emergency program financed by these internal-revenue taxes carried on the task of providing work for the island's unemployed. Military construction dwindled during the year until at the present time there is virtually none. The unemployment created by the completion of this work has been partially offset by increased inductions into the armed services, although the benefits do not always go to the same families. The short sugar crop of this year meant less work for many thousands of workers. No war industries are located in Puerto Rico although plans are being formulated to utilize the needle-work trades in the manufacture of garments for the liberated peoples of

the world under the United Nations Relief and Rehabilitation Administration program.

Keen interest is always displayed in politics in Puerto Rico, but with the approach of the elections in November, the battle cries of the opposing forces become almost deafening. The annual session of the insular legislature which started in February was unfruitful because of the impasse between the Senate and the Lower House, and only legislation of minor importance was passed. One very serious result of the deadlock was the failure to pass a bill appropriating additional funds for relief and work projects. This has led to litigation to test the applicability of section 34 of the Organic Act which provides for the automatic reenactment of appropriations in the event of a deadlock.

Puerto Rico has followed with passionate interest, the proceedings of both the Senate and House committees which are considering the proposed changes in the Organic Act.

AGRICULTURE

A prolonged and severe drought, the worst on record, had a serious effect on all crops. Sugar production, the biggest employer of labor, dropped from a normal of over 1,000,000 tons to 728,000 tons because of the previous year's fertilizer shortage and the drought. The Agricultural Adjustment Agency will make deficiency payments to growers for crop losses due to the drought. The quality and yield of tobacco were both adversely affected.

The effects of delayed and lost planting on many root and vegetable crops will be felt for some time to come. For a time this spring there was a relative shortage of locally grown vegetables and these were of an inferior quality.

INDUSTRY AND COMMERCE

The manner in which a limitation on the production of rum in Puerto Rico was imposed as a consideration to Cuba to make its molasses available for industrial alcohol production created a very bad impression in Puerto Rico. Although recent partial relaxation of the limitation similar to that granted Cuba at the same time has helped to relieve this situation, almost the entire quota for the calendar year had been produced by midsummer and the resulting unemployment and loss of revenue for the fiscal year 1945 are viewed with alarm.

Slow but steady progress is being made in the introduction of new industries. The glass plant, under construction by a subsidiary of the Puerto Rico Development Co., ran into unforeseeable wartime delays but is now rapidly nearing completion. The ceramics plant is functioning well and plans are formulated for expanding its operations into other types of clay products. Construction of the

paperboard factory has been started and plans are virtually complete for the wallboard mill. A proposed spinning and weaving mill for coarse fabrics and sugar bags is still in the planning stage. Private interests are about ready to start operation of a coconut fiber bag plant which is being completed at Mayaguez and a leather goods manufacturer is now operating in Cabo Rojo.

While many types of consumer goods are either nonexistent or scarce, the variety and quantity of goods on merchant shelves has shown a steady increase. Generally, merchants have suffered little or no financial loss despite shortages of goods because of higher than normal profit margins.

LABOR

There has been considerable unrest in labor ranks this year, particularly in the sugar industry. The time lost in strikes, however, has not been higher than usual. The two principal unions are engaged in a struggle to determine which will be the bargaining agent for the sugar workers. The Insular Labor Relations Board with the assistance of technical advisers lent by the National Labor Relations Board has held hearings on the question of an election among the workers to settle the issue.

THE CONSUMER AND THE COST OF LIVING

The War Food Administration, the Department of the Interior, the War Shipping Administration, the Office of Price Administration and agencies of the insular government have effectively co-operated to see that Puerto Rico was supplied with its basic needs and that prices did not skyrocket. Wages have increased in Puerto Rico during the war period but have not kept pace with the increased costs of living. The purchasing power of the wage earner's dollar of March 1941 has dropped to 71 cents and on some items such as food and clothing to 66½ cents. However, virtually no change has occurred in the purchasing power of the dollar in over a year and further devaluation of the dollar has been successfully blocked.

The total dry cargo tonnage for civilian use received during the 12-month period ending June 30, 1944, was 875,839 short tons, compared with 636,330 short tons received during the 12-month period ending June 30, 1943.

In accordance with previously announced policy, the procurement of many types of foodstuffs as well as animal feeds has been returned to private channels as fast as supply conditions warranted. The transfer of responsibility in most instances was accomplished without serious disturbance of distribution. The increase in available shipping tonnage has also permitted the importation of numerous articles which were of a less essential nature but desired by the people to be resumed.

THE FUTURE

Undoubtedly, the rate of revenue that Puerto Rico has received from internal revenue taxes will decline appreciably as beverage alcohol production increases in the States. Plans have been made to use the surpluses now in the Treasury for the permanent benefit of economic and social conditions on the island. It has been impossible during the war to obtain the building materials and supplies to do the seriously needed work on schools, housing, sanitation and hospitals. Plans for all of these have been prepared and this work can start as soon as material is available.

THE VIRGIN ISLANDS

This year saw the application to the Virgin Islands, for the first time, of the Selective Training and Service Act of 1940. As this act was not heretofore applied to the Virgin Islands, registration of Virgin Islands youth for service in the armed forces of the United States was not accomplished until the President of the United States by proclamation dated October 26, 1943, directed the registration of all male citizens of the United States not previously registered. Registration of Virgin Islanders began in November 1943. The first induction call was made in June 1944. At the close of the fiscal year there were 2,185 registrants in the age group 18-44 under the jurisdiction of the St. Thomas local board and 1,475 under the jurisdiction of the St. Croix local board. In the first call for 200 inductees, 149 were supplied from St. Thomas and 62 from St. Croix, all of whom were volunteers for immediate induction.

The financial condition of both municipalities improved materially during the year, especially in the municipality of St. Thomas and St. John where income taxes yielded \$1,295,380.50 as compared with \$465,447.76 in the preceding fiscal year, an increase of 178.3 percent.

In the municipality of St. Croix income tax collections were \$114,836.45 as compared with \$46,977.22 in the preceding fiscal year, an increase of 144.45 percent. Total revenues of this municipality amounted to \$262,684.89 as compared with \$194,440.62 in the preceding year, an increase of 35 percent. This tremendous increase in revenue from income taxes is attributable primarily to the prosperity of the rum manufacturing business as well as the increased rates and lower exemptions.

The municipality of St. Thomas and St. John, with its surplus revenues, created a hospital building fund with a deposit of \$200,000; a high school building fund of \$50,000; a sewer system fund of \$150,000; a reserve fund of \$100,000; and a scholarship fund of \$10,000. Almost \$300,000 of these funds were invested in War Savings bonds. In spite of increased revenues the municipality of St. Croix still re-

quired a congressional appropriation to meet the deficit in its treasury, even though municipal services have continued at a minimum.

The withdrawal of the Work Projects Administration of the Federal Works Agency from the Virgin Islands in December 1943 left a considerable number of unfinished projects. It also eliminated relief employment for approximately 1,500 persons. Projects for nursery schools, school lunches, sewing, health, and vegetable growing projects, formerly operated by the Work Projects Administration, were taken over and operated by the Municipal Governments from December 1943 to June 1944. With the curtailment of employment on defense construction projects in St. Thomas during the closing months of the fiscal year, unemployment conditions were accentuated. In St. Croix there was considerable unemployment until the Virgin Islands Co. opened the cane harvesting season late in February which continued well into the month of May. It is estimated that there are at the present time between 1,500 and 2,000 unemployed employables in the Virgin Islands. For a small portion of these, employment will be provided on municipal projects made possible by the increase in income taxes on largely increased distilleries' profits.

Legislation was introduced in Congress for extension to the Virgin Islands of the benefits of those titles of the Social Security Act providing for old-age assistance, aid to dependent children, aid to the blind, maternal and child welfare and public-health work. As American citizens, Virgin Islanders should share equally with continental citizens in the benefits of this act. Certainly there are few spots under the American flag which so desperately need these aids. No action has been taken on this bill beyond hearings held by a subcommittee of the Senate Finance Committee.

The Agricultural Experiment Station continued its efforts to improve farming practices and livestock for the farmers of the Islands. For years the policy of the station has been to provide extension and demonstration services. Experimentation has been reduced to a minimum. Limited appropriations have prevented an adequate broadening of the scope of its usefulness. It is proposed to request sufficient funds to carry out a real program of agricultural extension which includes growing and distributing various kinds of vegetable slips, importing and selling vegetable seeds, growing of field corn for seed distribution, using station equipment for land preparation for small farmers, classroom lectures and field demonstrations in agriculture, instruction by staff members in better methods of planting and cultivation processes, breeding and selling of purebred animals to improve the breeds on the Islands and free veterinary service.

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teriorated, hundreds of pensioners were receiving pitifully low monthly allowances. The lepers have had woefully inadequate provisions. Commercial and vocational education were hardly existent. Water supply is precarious and insufficient for drought periods. The increase in revenue of the municipality of St. Thomas and St. John during the past 2 years enabled correction of many of these deficiencies in that municipality. Departmental operations have been improved and expanded. Scholarships in health education, public-health nursing and agriculture have been provided. In the municipality of St. Croix an increase in revenues during the past fiscal year and an estimated increase in the coming fiscal year have been budgeted to relieve some of the worst of these deficiencies and also to liquidate the indebtedness which has been long hanging over St. Croix's headmonies which were borrowed to meet operating deficits for previous years. A deficit for the fiscal year had to be met by congressional appropriation as usual.

A Bill, H. R. 5029, was introduced into the House of Representatives to assist in providing capital funds to remedy many of these conditions in the Virgin Islands. If this bill passes the Congress it will provide total appropriations approximating ten million dollars for certain new hospital facilities, sanitation and fire protection, sewer and water systems, water supply, schools and educational facilities, highways, roads and streets, recreational facilities, telephone and radio communication, malaria control, and slaughterhouse and public market facilities. Unfortunately, its terms narrowly limit the works to be undertaken to those recommended by a survey undertaken some time ago with no provision for administrative revision in the light of needs that may exist after the war. No funds would be allowed for continuation of water-conservation work in St. Croix, a project vital to the agricultural life of the island.

THE PHILIPPINE ISLANDS

The Philippines have now been under enemy control for more than 2 years. Despite extravagant Japanese claims as to the extent to which the Filipino people are embracing the idea of the Greater East Asia Co-Prosperity Sphere, there is increasing reliable evidence that the great mass of the Filipino people are in no way deceived and remain steadfastly loyal to the cause for which they have made such heavy sacrifices. That the Japanese and the puppet government, which they have established, are having serious troubles is indicated by information obtained from many reliable sources, including the rather naive admissions of the Japanese themselves. There are evidently serious shortages of almost all essential commodities, notably food and clothing. This and the issuance of worthless currency have brought about inflation, which has made it necessary for the Japanese, after first

reducing the wage scale, to increase it far beyond anything known under the former commonwealth administration. It is inevitable under such conditions that unrest and disorder will result, and that this has occurred is evidenced by the frequent appeals of the puppet leaders and the Japanese for the people to be patient and peaceful and for repeated announcements that law and order have been reestablished. The Japanese have made a great show of attempting to convince the people of their honest intentions. The principal step in this direction was their sponsorship of a convention for the adoption of a constitution followed by the establishment of a so-called independent government.

The constitution was drawn up and approved by an organization headed by persons collaborating with the Japanese, and there was not even any pretense of participation by the people themselves.

Stripped of all excess verbiage it provided for a one-man rule upon whom the only check is by his own appointees and in whose selection the people at large have no voice. By controlling one man, the Japanese control the entire government.

José P. Laurel, who from the very beginning has been one of the leaders among those collaborating with the Japanese, was, in due course, named president of the puppet regime.

It must be recorded with regret that the individuals who have taken the leading part in this hollow mockery are for the most part men who were formerly high in the councils of the Commonwealth Government.

That their activities are a matter of serious concern to this Government is indicated by the fact that the President on June 29, in announcing his approval of a bill relating to the rehabilitation of the Philippines, said, "Those who have collaborated with the enemy must be removed from authority and influence over the political and economic life of the country."

The Commonwealth Government in Exile under the leadership of President Manuel L. Quezon¹ and Vice President Sergio Osmeña continued to function in Washington. Under the provisions of the Commonwealth Constitution, President Quezon's term of office was to expire on November 15, 1943, and the vice president would assume office. However, at the request of the Government in Exile, Congress, by a joint resolution approved by the President November 12, 1943 (now Public No. 186), provided that President Quezon should continue office until the President of the United States should "proclaim that constitutional processes and normal functions of government

¹ President Quezon died at Saranac Lake, N. Y., on August 1, 1944, and Mr. Osmeña was sworn in as president of the Commonwealth the same day, in the Office of the Secretary of the Interior.

President Osmeña landed at Tacloban, Leyte, with General McArthur, commander of the American forces, which began the reoccupation of the islands on October 20, 1944.

shall have been restored in the Philippine Islands." Thereafter, the vice president is to assume the office of the president and serve until his successor is elected and qualified.

On June 29, 1944, the President approved two joint resolutions of Congress pertaining to the Philippines. The first (now Public No. 380) declares it to be the policy of the United States Government to establish an independent government after the repulsion of the enemy and the restoration of democratic processes. The President is authorized, after negotiation with the president of the Philippines, to acquire bases in the islands for the mutual protection of the United States and the Philippines, and if he finds that orderly processes of government have been restored, to proclaim Philippine independence prior to July 4, 1946, which is the date originally contemplated by existing law in the Independence Act.

The second resolution (now Public, No. 381) provides for a joint rehabilitation commission to be composed of 18 members, 3 to be appointed by the President, 3 by the president of the Senate, 3 by the Speaker of the House, and 9 by the Philippine Government. This commission is directed to investigate and make recommendations concerning all matters affecting post-war economy, trade, finance, economic stability, and rehabilitation of the islands.

The functions of the United States High Commissioner were transferred to the Secretary of the Interior by an Executive order of the President dated September 16, 1942. In compliance with instructions of the President to the Secretary at that time, the Department has been engaged in a study of the many problems which will arise when the islands are reoccupied.

Many thousands of Americans are prisoners of the Japanese, including some 4,000 civilians, for whom the Department feels a special responsibility. In cooperation with the State Department, the Red Cross, and others interested, all possible means of assisting them all are being constantly explored. The plight of these unfortunate people, who have now been held for more than 2 years, is made much more serious by reported food shortages and inflationary prices.

Puerto Rico Reconstruction Administration

BENJAMIN W. THORON, Administrator



WHEN the President under authority of the Emergency Relief Appropriation Act of 1935 established the Puerto Rico Reconstruction Administration as an agency to administer approved projects for providing relief and work relief and for increasing employment in Puerto Rico, he stated that its main objective should be permanent reconstruction of the island's economy in terms of agricultural rehabilitation, rather than mere immediate palliative relief. Continuation of such progress as has thus far been achieved through projects with long range reconstruction possibilities, will be no less essential in the post-war period than it has been during the war, when the ever-prevailing unemployment problem was alleviated, but only temporarily, by work on Army and Navy projects.

During the fiscal year 1944, as in the 2 previous years, the Puerto Rico Reconstruction Administration has been financed with funds allotted by the President out of the Puerto Rico revolving fund, consisting only of income and the proceeds of the disposition of property derived from the Puerto Rico Reconstruction Administration's operation of projects which were financed with funds originating in the Emergency Relief Appropriation Act of 1935. The comparatively small amounts thus available have limited the Puerto Rico Reconstruction Administration's activities primarily to preservation of the most essential features of its former broad program of rural rehabilitation, and to protection of investments of the Government in housing, loans to cooperatives, etc., produced by projects of previous years. Despite these limitations the Puerto Rico Reconstruction Administration has endeavored to make its work useful to the prosecution of the war as well as of service to the island's post-war needs.

For its activities during the fiscal year 1944, the President authorized expenditures by the Puerto Rico Reconstruction Administration out of the Puerto Rico revolving fund (49 Stat. 1135) as follows:

Operation and maintenance of housing projects and facilities-----	\$250,000.00
Management of lands and leases connected with the Lafayette project-----	60,000.00
Operation of Castaner farm project-----	60,000.00
Supervision of and making and servicing of loans to cooperatives----	610,000.00
General administration-----	160,000.00
1943 unobligated balance for construction of rural houses-----	204,644.43
Operation of Central Service Farms-----	150,000.00
Subdivision and sale of lands in Lafayette district for food crop production-----	11,000.00
Total-----	1,505,644.43

A summary of the year's principal activities follows:

HOUSING MANAGEMENT

Operation of the Puerto Rico Reconstruction Administration's 1,210 urban family dwelling units and 6,254 rural houses, together with 4,891 3-acre parcels on which no houses have been built, produced rental collections in round figures of \$335,500 as against outlays for management and maintenance of \$245,000. On vacant parcels 300 additional rural dwellings were constructed of rammed earth (locally known as *tosca*), mixed with a small amount of cement. Farm laborers there resettled were assisted in raising subsistence crops to supplement their meagre earnings, so that completion of these houses added 1,500 acres of formerly unproductive land to the potential food supply of the island. As of June 30, 1944, all of the urban houses and 98.5 percent of the rural houses were occupied, and 80 percent of the parcels without houses were rented to farm laborers of the neighborhood for the nominal sum of 50 cents per month. It has been the policy to permit tenants who desire to become owners of the homes or parcels they occupy to enter into long-term purchase agreements, of which 287 in the urban zone and 3,621 in the rural districts were executed during the fiscal year.

RURAL REHABILITATION

Closely tied to the rural housing developments, which are really the backbone of the rural rehabilitation program, is what is known as the Central Service Farms Project. Federal funds of \$150,000 were supplemented by an insular legislative appropriation of \$60,000 and approximately \$110,000 made available by the Insular Emergency Council. The most important accomplishment of the project was its contribution to the food supply and income of the island by the planting of 15,000 acres in subsistence crops and 3,000 acres in cash

crops on lands of the Federal Government occupied by the Puerto Rico Reconstruction Administration resettlers. Seeds produced by 550 acres of seedbeds in the seven Central Service Farms were distributed, and fertilizers and insecticides were furnished to resettlers. Agronomists gave constant advice and supervision to cultivation, harvesting, and marketing of their subsistence crops. Resettlers were not paid for labor on their own parcels, but were paid from both Federal and insular funds for labor performed in the Central Service Farms, in the planting of fruit trees on Federal lands, in the repair and maintenance of the intrafarm roads, and the operation of some 34 rural waterworks systems, which supply potable water gratis to approximately 100,000 rural dwellers.

At the Castaner project 1,163 acres were devoted to production of coffee, sugarcane, citron, vanilla, and minor crops, furnishing employment to 200 rural families resettled on 1-acre subsistence parcels. Sale of produce from the farm proper fell \$4,780 short of the \$60,000 allotted for operation, not a bad showing considering the storm of near hurricane proportions in October 1943 which damaged much of the planting, and the 7 months' drought which greatly reduced the coffee crop. In addition to the 25-bed hospital at Castaner mentioned in last year's report as established by the National Service Board for Religious Objectors, a similar 25-bed hospital was opened during the latter part of the fiscal year 1944 at the Puerto Rico Reconstruction Administration's La Plata project, and another health unit has been started at the Zalduondo Rural Rehabilitation Unit. These institutions, authorized by the Director of Selective Service as adjuncts of Civilian Public Service camps, with technical supervision of the planning and direction of the work program by the Puerto Rico Reconstruction Administration, are providing preventive and curative health treatment to thousands of the Puerto Rico Reconstruction Administration resettlers and other rural dwellers for whom such facilities were never before available.

COOPERATIVES

As in previous years, particular attention has been given to the vegetable, cotton, and other marketing cooperatives, and to increasing the production of the butyl alcohol plant of the Lafayette Sugar Mill Cooperative. Increase to \$610,000 of the previous year's \$250,000 allotment for loans to and supervision of cooperatives, was occasioned by needs of the Lafayette Cooperative. Difficulty in meeting its obligations due mainly to former operating losses of its pioneer solvents plant, required the furnishing of an additional \$500,000 loan last December as part of a general refinancing of the mill's obligations to the Government. If for no other reason, this additional loan and re-

financing were justified by the fact that the butyl alcohol plant was able to increase production, as desired by the War Production Board, to its full capacity of more than 5 million pounds of solvents per year for the exclusive use of lend-lease and war contractors, as contrasted with 3½ million pounds exported the preceding year. Further, operations of the solvents plants have produced a substantial profit for the year, amounting to about three times Lafayette's loss from its ordinary sugar mill operations. That loss and a comparable loss sustained by the Los Canos Sugar Mill Cooperative, which is likewise financed by the Puerto Rico Reconstruction Administration, are attributed to a reduction of about 25 percent in the sugar produced in the respective areas, due partly to shortage of fertilizer, and partly to the island-wide drought. Prospects for a better crop the coming season at present are good.

A new cooperative known as the "Cooperativa de Cosecheros de Cidra" was organized and obtained a loan from Puerto Rico Reconstruction Administration of \$50,000 for the purpose of stimulating the growing, curing, and marketing of citron and kindred fruits in distressed coffee areas. These products, for which there is constant demand, have hitherto had little encouragement. Market conditions are favorable, and while operations were started late in the fiscal year, the citron curing plant is now operating at full capacity. Additional loans totalling \$22,000 were made to four vegetable marketing cooperatives; operations have so stimulated plantings by farmer members as to increase the cooperatives' 1943 business of \$100,000 to approximately \$300,000 for the fiscal year 1944. Further, the vegetable cooperatives have recently organized a central marketing agency at Rio Piedras to attract buyers in the metropolitan district, and to offset the loss of the former New York market for some of their produce, particularly tomatoes, which before the war brought a high export price. The Vanilla Cooperative has processed and will market the largest crop in its history, approximately 5,700 pounds of cured vanilla beans. The Cotton Growers Cooperative has continued to market sea island cotton (in demand for war needs) amounting to about 1,600 bales. The Sociedad Agricola, a Puerto Rico Reconstruction Administration-financed cooperative which purchases farm supplies for members and patrons, has had a particularly successful year, increasing sales of fertilizer, insecticides, feeds, etc., to over \$900,000 as contrasted with the previous year's record of around \$350,000. Close supervision is maintained of the accounting and operations of all the cooperatives to which the Puerto Rico Reconstruction Administration has made advances.

CONCLUSION

For the fiscal year 1945 beginning July 1, 1944, the President has authorized the Puerto Rico Reconstruction Administration to expend \$1,190,324 out of the Puerto Rico revolving fund for the continuation of projects similar to those herein reported. These will at least conserve some of the social and economic progress achieved, which would be completely lost if the program were entirely terminated. But very much larger sums of money, whether Federal or insular, will have to be expended for many years to come if permanent reconstruction of the island's distressed economy is to be accomplished.

War Relocation Authority

DILLON S. MYER, Director



THE fiscal year ending June 30, 1944, was an especially significant period in the history of the War Relocation Authority which became an agency of the Department of the Interior on February 16. This year brought about a full-scale development of the Authority's program to provide for the relocation, maintenance, and supervision of 110,000 persons of Japanese ancestry who were evacuated by military order from the West Coast in the spring of 1942.

The general objectives of the program had been defined in broad outline shortly after the agency was created by a Presidential order on March 18, 1942, but much had to be done before the program could be put into full operation. Of foremost importance was the need to acquire knowledge of the essential character and composition of the evacuee population in order to devise the most practicable procedures and techniques for resettling in normal communities those people who presented no danger to the national security. Methods of separating the loyal and law-abiding element from the trouble makers and others whose stronger ties were with Japan had to be developed. Ways to relocate those who were law-abiding and loyal had to be planned and organized. At the same time, the establishment of the relocation centers and the organization of personnel and services to provide adequate care and supervision for the people temporarily quartered in them also called heavily on the time and resources of the War Relocation Authority in the first year of its existence.

Three basic considerations have been taken into account in formulating the Authority's program for the past 12 months. First, the War Relocation Authority has been fully cognizant at all times of the necessity for observing adequate precautions for the national security. Secondly, it has recognized an obligation to preserve the basic American principles of humanity and justice by protecting the constitutional rights of the American citizens involved in the evacuation, and by dealing fairly with the aliens. Thirdly, it has held con-

sistently to the belief that the best interests of both the evacuees and the Nation call for the liquidation of the relocation centers as rapidly as possible by returning the eligible residents to the mainstream of American life.

The ultimate goal of the War Relocation Authority is to complete the job of relocation of all evacuees in normal communities outside of relocation centers. The sooner it can complete its program, the more successful its service to the Nation will have been.

THE RELOCATION PROGRAM

Several factors had combined to delay the progress of relocation outside the centers before the summer of 1943. At the start, it was necessary to develop procedures for determining which members of the evacuee population should be permitted to depart from the centers on indefinite leave, and which ones should be detained. Time was needed to perfect these procedures, and to conduct individual hearings for thousands of evacuees whose eligibility or ineligibility for leave clearance could not be otherwise established.

There was, furthermore, the need to develop practicable plans for getting older people and families out of the centers. In the year preceding July 1, 1943, between nine and ten thousand people had relocated, but the great majority of them were young Nisei without family responsibilities. The population of the centers was getting harder to move as the percentage of younger people decreased.

Various other deterrents were also in evidence. Among them were the uncertainty of the evacuees regarding public sentiment, the difficulty of obtaining clearance for them to work in war plants, and housing shortages.

It was early recognized that the success of the relocation program would be determined, in a large measure, by the degree to which the evacuees approved its purposes. As early as July 1943, relocation committees to plan and encourage relocation had been organized among the residents of several centers, and increasing emphasis was placed on strengthening these committees and organizing new ones in the months that followed. By the end of the year, every center had a relocation planning committee, composed either entirely of evacuees or jointly of evacuees and staff members. Issei were well represented on these committees and were especially helpful in bringing evacuee questions and suggestions to the attention of the administrative staff.

The earlier relocation of younger Nisei had been mainly to the cities, but evidence was mounting in the centers that more emphasis was needed on rural relocation. Approximately 43 percent of the evacuees had come from farming communities, and most of those with agricultural backgrounds wanted to return to the land. They wanted opportunities which would enable small groups of families to relocate

together, where they could have the association of neighbors of Japanese descent, and they stressed the necessity of sending responsible evacuee representatives into the field to investigate the opportunities before decisions could be made.

Many families had suffered heavy losses in the evacuation. If they were to leave the centers to start new farming ventures, they needed financial assistance.

In November, the national office undertook a program to make available to these farm families the assistance that they seemed to require. The relocation officers in the field were directed to give specific attention to the development of opportunities for families to resettle in small groups, and exploratory trips by responsible evacuee representatives were authorized. On the financial side, the stimulation of credit unions among the residents of the centers was suggested as one means of providing funds for families that needed financial aid, and detailed information was provided on the availability of loans from Federal and private agencies.

Other developments of the relocation program were made, following studies and surveys of the problems presented. During the early part of 1943, each individual who left a relocation center on indefinite leave was given a leave assistance grant of \$50, with \$100 as the total amount that could be granted to any one family. To encourage the resettlement of larger families, the grant was reduced in October to \$25 per individual and the \$100 limit was removed. An agreement was made with the Federal Security Agency which made relocated evacuees eligible to receive assistance under the program for aliens and other persons affected by restrictive governmental action during the war. The cooperation of the Federal Housing Administration was obtained to help the War Relocation Authority staff in determining the acceptability of the evacuees for housing in various localities, and to suggest localities where housing opportunities for evacuees appeared more promising.

At the relocation centers, welfare counselors were assigned to interview families with a view to breaking down the rationalizations of reluctant families and to gathering information which would help the War Relocation Authority to plan its future course of action more realistically. Relocation officers and other staff members who were familiar with conditions in various sections of the country visited the centers both singly and in teams to bring first-hand information to the residents and to answer questions for them. Meetings and forums were held, informational publications were distributed, and motion pictures borrowed from public and private agencies were shown, depicting various cities and rural areas.

The need to get information into the centers, regarding the communities and areas where the people were encouraged to relocate

emphasized repeatedly. Few of the evacuees had ever been east of the Sierra Nevadas before they were evacuated. The Middle West and East were regions almost unknown to them.

To facilitate the gathering of information, reports officers were assigned to the principal relocation offices in Denver, Kansas City, Chicago, Cleveland, and New York City. The Washington reports office also set to work on the preparation of descriptive and illustrated pamphlets designed to reveal the character of the relocation areas to the evacuees. Personal stories of individuals and families who had relocated successfully were found to be especially effective in the centers.

Prior to the fall of 1943, all phases of the relocation program, both at the centers and in the Washington office, were functions of an Employment Division which was also responsible for the employment of evacuees to maintain center operations. In November, however, a new Relocation Division was organized to give exclusive attention to the relocation program, while other functions of the Employment Division, which was then discontinued, were transferred to the Administrative Management Division.

Six relocation areas had already been established with headquarters in Salt Lake City, Denver, Kansas City, Chicago, Cleveland, and New York City. These offices now came directly under the supervision of the Relocation Division in Washington, and they, in turn, were responsible for supervising all branch offices set up in the regions that they represented.

It had been the policy of the War Relocation Authority from the beginning to discourage the concentration of the evacuees in large numbers in any one community; nevertheless, the people from the centers showed a strong disposition to congregate in certain localities. The most popular localities for resettlement were in the Rocky Mountain States, especially in Colorado and Utah, and in the Chicago metropolitan district. The concentrations aroused local opposition particularly in the Inter-Mountain region.

The Relocation Division moved to meet the problem, under the authority of the Director, by restricting permission to relocate in the Inter-Mountain and Western Plains States to the members of families already relocated in those areas, and by stressing the relocation program in the Middle West and East. The New England States were set apart in a new relocation area with Boston as its headquarters. In May and June, a start was made toward developing resettlement in certain parts of the South, by opening relocation offices in New Orleans and Savannah.

At the start of the relocation program, emphasis had been placed on securing job offers for the evacuees while they were still residing in the centers. Many offers were obtained, but for several reasons the

evacuees were reluctant to accept them. One reason was that many of the jobs were not the kind which they wanted or which they were trained and experienced to fill. Since the demand for domestics was especially keen, the supply of domestic workers at the centers rapidly approached the point of exhaustion. Another reason was reluctance to accept employment without meeting the prospective employers in advance and learning, from first-hand observation, the character and conditions of the job that had been offered. Too often, even when evacuees accepted offers, they stayed on the jobs only a short time before switching to other employment. It became obvious that a new approach was needed to the relocation problem.

To meet the situation, the relocation officers in the field were instructed to cease sending to the centers long lists of job offers, which were often more confusing than helpful, and to prepare, instead, brief summaries on employment conditions in the areas where they were assigned to duty, emphasizing information about the abundance or scarcity of certain kinds of opportunities, the attitude of the community, and the housing situations. They were directed to give more attention to the development of community acceptance and cooperation, and to seek community invitations for groups of evacuees to come from the centers to look over local conditions before accepting employment.

It was the plan to shift as much responsibility as possible to voluntary cooperating committees. The churches and welfare agencies have been especially helpful in organizing these committees which were functioning, by the end of the fiscal year, not only in every middle-western and eastern community where a relocation officer was stationed, but in a number of other communities as well.

The functions of the cooperating committees were to foster favorable community sentiment, and to assist evacuees in adjusting themselves to normal community life. Insofar as possible, they were to help arrivals from the centers to find acceptable employment and housing, and to develop social and recreational opportunities for them. Especially, they were asked to cooperate in the development of plans to accelerate the relocation of families and older people.

Two devices were used to provide temporary residence for evacuees while they were looking for employment. In several cities, special hostels were opened by cooperating groups; in other places arrangements were made with YMCA's, YWCA's, settlement houses, and churches, to make quarters available for them.

There had not been sufficient time, by the end of the fiscal year, to make a fully adequate test of the effectiveness of the new relocation policies in stimulating the resettlement of families and older people. Of the 16,846 individuals who departed from the centers on indefinite leave during the 12 months, by far the greater number were young

Nisei without family responsibilities, but an encouraging increase was noted in the number of total family groups that relocated toward the end of the period. More notable was the increase of relocation farther east. While the Great Lakes States—Wisconsin, Illinois, Indiana, Michigan, and Ohio—received the largest number, the percentage increases in the Middle Atlantic and New England States were much higher. The trend was definitely eastward.

The acceptance of the evacuees in the communities where they relocated was generally good. There were a few incidents, however, that emphasized the need for the cooperating committees, and for the development of favorable community sentiment before the evacuees arrived. In New York City, resistance developed to the establishment of a hostel in Brooklyn, but was overcome by the efforts and influence of individuals and organizations cooperating in the War Relocation Authority program. Other incidents involving small groups of evacuees occurred in New Jersey, Delaware, and North Carolina, and in two midwestern communities, one in Iowa and one in Nebraska. The general reaction of the country at large was distinctly critical of these communities and favorable toward the evacuees.

The progress of relocation to the end of the fiscal year permitted one center—the Jerome Relocation Center in Arkansas—to be closed on June 30. Four other centers, where space was available, were designated to receive the Jerome residents. A transfer of 2,489 Jerome residents was made by truck to Rohwer, 35 miles north; 2,049 were sent to Gila River in Arizona; 549 to Granada in Colorado, and 499 to Heart Mountain in Wyoming. Before the transfers started, efforts were made to induce as many people as possible to relocate. Those who chose to relocate numbered 518.

SEASONAL WORK LEAVE

An early development in the leave program of the War Relocation Authority was an arrangement whereby groups of evacuees were permitted to leave the centers to assist in harvesting crops in the regions where the centers are located. Under the provisions of the leave granted to them, they were required to stay in specific areas unless authorized to move elsewhere by the relocation officers. At the termination of the work, they were returned to the centers unless, in the meantime, they had obtained indefinite leave.

These workers, who were employed chiefly in the sugar beet harvest, were credited with saving thousands of acres of beets in 1942 and 1943. Others helped to harvest potatoes, long staple cotton, and other crops.

During the year a considerable number of seasonal leaves were converted into indefinite leaves to enable the workers to accept offers of permanent jobs in the communities where they had been temporarily

employed. When certain areas of the West were restricted for relocation purposes to avoid concentrations, however, the usefulness of seasonal leave as a stepping stone to relocation was considerably diminished. Moreover, as time progressed, a good many evacuees—especially young men—began to show a disposition to favor seasonal leave as more desirable than indefinite leave. Each season, after several weeks of outside employment at good wages, they could return to the centers with enough pocket money to satisfy their incidental needs until another harvest season arrived, and they were increasingly reluctant to apply for indefinite leave under terms that made return to the centers and the resumption of living at Government expense more difficult.

The competition among agricultural employers for workers from the centers also presented a troublesome problem. Even at the outset, the supply of available workers was never sufficient to meet the total demand, and, as the employable population of the centers dwindled, through relocation, the inadequacy of the supply became more acute.

In February 1944, the seasonal work leave program was modified to provide for the issuance of seasonal leave only to persons recruited for agricultural work through the War Food Administration, and employment was authorized only in counties approved by War Relocation Authority relocation officers. This modification of the program improved controls and the systematic granting of leaves to meet critical manpower shortages. It was still impossible, however, to supply enough workers to satisfy all of the calls that were made for them.

There were 7,603 seasonal work leaves granted during the last half of 1943, and 5,029 during the first half of 1944, making a total of 12,632 for the 12-month fiscal period.

THE SEGREGATION PROGRAM

It was recognized from the time when the War Relocation Authority was first organized that some of the evacuees preferred to think of themselves as Japanese rather than Americans. Among them were people who wanted to return to Japan, and possibly some who could not safely be granted the privilege of moving about the country at will in wartime. These people had to be set apart from the others who desired to remain law-abiding residents of the United States.

Three categories were established for segregation which was, by every measure, the major War Relocation Authority undertaking in the fall of 1943. First, all persons who had filed applications for repatriation or expatriation to Japan, and who had not retracted their requests before July 1, 1943, were scheduled for immediate segregation at the Tule Lake Center in northern California. Also included in the first segregation were those who, in a registration conducted at

all of the centers in the spring of 1943, had answered in the negative a question pertaining to their loyalty to the United States, or who had failed or refused to answer it, and who had not changed their answers to the affirmative before July 15, 1943, or who, having shown a disposition to change their answers, had failed to satisfy the project director involved in each case that the changes were made in good faith. In the third category were all persons to whom the Director had denied leave clearance after individual hearings. Designated to receive these individual hearings were all persons who (a) were subjects of adverse reports by Federal intelligence agencies, (b) had changed their answers to the loyalty question from a negative or a qualified affirmative to an unqualified affirmative, (c) had retracted their applications for repatriation or expatriation to Japan, (d) had not been recommended for leave clearance by the Japanese-American Joint Board established in the office of the Provost Marshal General, or (e) for any other reasons were believed to be loyal to Japan. Also involved in the segregation was a fourth group of considerable magnitude composed of the families and dependent relatives of the actual segregants.

The major movement of the first two groups of segregants was accomplished between the middle of September and the middle of October, when 8,573 persons were transferred to Tule Lake. In the same period, 6,250 persons, already residents at Tule Lake, who were not subject to segregation, were moved to other centers to make room for the arrivals. Another movement of 1,876 persons, whose transfer to the segregation center had been postponed to permit the construction of barracks to house them, was made in February, and a third transfer of 1,665 persons was conducted in May. These movements were all accomplished without disorders or serious mishaps of any kind.

Persons in the third category of segregants, designated to receive individual hearings, have been sent to Tule Lake from time to time, and others will be sent as they fail to convince the Director, or his authorized representatives, that they should be granted leave clearance. Decisions were made on 8,834 cases which were reviewed during the fiscal year; 7,307 were approved for leave clearance, and 1,527 were disapproved.

Evacuees who have been denied leave clearance may appeal to a board which has been chosen with special care outside the War Relocation Authority organization to give the appellants impartial hearings. This appeal board, however, serves only in an advisory capacity; the authority to grant or deny leave clearance rests in the final analysis solely with the Director of the War Relocation Authority. Twenty-four appeals were made prior to June 30, 1944, and were scheduled to be heard by the Appeal Board in July.

There were 8,981 requests for repatriation and expatriation during the year, which raised the total number of effective requests to 15,366. The cancellations numbered 1,060. Three hundred and thirteen persons were sent to Japan under an exchange of nationals arranged by the State Department.

A marked increase in the number of requests for repatriation and expatriation has followed every major change in government policy affecting the evacuees. About 10,000 of the requests on file were made during or immediately following crises brought about by the Army and leave clearance registration which was conducted in the spring of 1943, the segregation activities of the summer and fall, and the Army announcement on January 20, 1944, that Nisei were to be inducted under Selective Service procedures.

A large percentage of the requests appear to be based more on emotion than reason. The evacuation, the loss of economic security that went with it, and evidences of antagonism outside the centers have filled the evacuees with fear for the future, and any change of policy adds to their alarm. Few of them are motivated to request repatriation or expatriation because they have any real interest in Japan or expectation of going there. They are tired of moving and Tule Lake seems to them the one place where they may be allowed to stay for the duration of the war. They seek segregation to escape pressure to relocate under wartime conditions, to hold their families together, or to protest against the evacuation. Others who do look to a future in Japan have built up fantasies of life there with hardly any actual knowledge of the country they are choosing.

The population of Tule Lake at the end of the fiscal year was 18,672. Of this number, about 3,300 were minors under 17 years of age, and approximately 1,800 others were living at Tule Lake Center merely to be with members of their immediate families who had been segregated.

A relatively small element of troublemakers in the center has caused several disturbances which the major part of the population has had no voluntary or intentional part in abetting. The first occurred immediately after the first segregation movement when a group of ruffians attempted to gain control of the community. On November 1, during a visit of Director Myer to the center, agents of the troublemakers announced in the mess halls that the National Director would make a speech at the main administration building shortly after noon. As a result, between 3,500 and 4,000 men, women, and children gathered in the administration area. While they waited for the Director to appear, 17 men entered the building and presented a series of demands. Mr. Myer told them, and later repeated to the crowd outside, that the War Relocation Authority would consider requests from the evacuee population, provided they

were in the framework of national policy, but that it would not accede to demands. After he spoke, the crowd dispersed.

In the meantime, however, about a dozen rowdies, evidently members of a gang, had entered the center hospital and administered a beating to Dr. Reece M. Pedicord, the Chief Medical Officer. There was no evidence that the crowd as a whole was aware of the plot or consciously a part of it.

This demonstration was grossly exaggerated by certain West Coast newspapers. Charges that the crowd was angry and violent in spirit, that many members of it carried knives and clubs, and that others carried straw soaked in oil to fire the buildings were not substantiated by later testimony. Of the 31 witnesses, members of the War Relocation Authority's staff at Tule Lake, who commented on the attitude of the assembly, some described it as quiet but expectant, others spoke of it as quiet and friendly, and several remarked on the holiday spirit that seemed to prevail especially among the children.

Several days later, on the evening of November 4, a group of about 400 young men, many armed with clubs, entered the administration area where some of them congregated in the vicinity of the warehouses and the motor pool. Others surrounded the residence of the project director who telephoned to the commanding officer of the military guard outside the gates and asked him to take full control of the center. Troops entered at once and restored order, in accordance with a memorandum of understanding between the War Relocation Authority and the War Department, which had been in effect since the inception of the War Relocation Authority program. This agreement stipulated that the Army would provide special assistance to the War Relocation Authority in such emergencies.

The Tule Lake center remained under control of the Army until January 14, when the War Relocation Authority again took over internal administration. During the period of Army control, the War Relocation Authority personnel continued to function under the orders of the commanding officer.

About 375 persons who had been implicated in the November disturbance or whose influence was believed to be detrimental to the law and order of the center, were subsequently confined in a "stockade" under Army orders, and most of them were still confined when the War Relocation Authority resumed control of the center. The original group included approximately 100 aliens and 275 citizens. An arrangement was made with the Department of Justice to transfer from the "stockade" to Justice Department internment camps those aliens who were considered dangerous to the national security.

Later disturbances at Tule Lake were of a minor character and generally consisted of attempts by the strongly pro-Japanese element to intimidate other residents. These infringements on the peace

of the community have not been easy to curb, owing to the frequent difficulty of identifying the aggressors. They serve, however, to spotlight the fact that the population of Tule Lake—contrary to popular impression—is not exactly a homogeneous group entirely motivated by a feeling of allegiance to Japan.

NATIONAL SELECTIVE SERVICE

On January 21, the Army announced that Selective Service inductions of Nisei, which had been suspended in the spring of 1942, were to be resumed. The result was the calling of 3,377 men before July 1. Of this number, 1,430 were accepted, 460 were inducted into the Enlisted Reserve Corps, and 194 entered active duty. One hundred and eighty-eight refused induction when called, and 106 of them were arrested by officials of the Department of Justice. No action had been taken before the end of the fiscal year with regard to the others who continued to refuse induction.

The principal resistance developed at the Heart Mountain Relocation Center where 76 young men refused to be inducted owing largely to the influence of a group in the community which called itself the "Fair Play Committee." The head of this committee argued that it was unjust to draft Nisei until all discrimination against Japanese-Americans was eliminated, and the Nisei were admitted to all branches of the Army and Navy on an equal footing with other Americans. These arguments were cautiously phrased, however, in an effort to avoid statements that might incriminate the committee members. The committee chairman was a citizen of the United States, born in Hawaii, had never been to Japan, and had no record of disloyalty or disobedience to law prior to the evacuation. On April 1, he was segregated in Tule Lake, together with several of his principal supporters, where he was later taken into custody by the Federal Bureau of Investigation on charges of violating the Federal sedition and conspiracy laws.

The 188 young men who refused induction slightly exceeded one-half of 1 percent of the total number called by the Army. The great majority answered the call willingly, and the departure of most of the boys who have been summoned to active duty has been marked by patriotic demonstrations in the centers.

CONDITIONS IN THE RELOCATION CENTERS

The adoption of evacuee government charters at four relocation centers during the latter half of 1943 brought to eight the number of centers which have instituted formal plans of representative community government. At Manzanar, which remained the only relocation center on June 30, 1944, without a community council elected by the people, the project director continued to retain direct authority

over all community affairs, but with the counsel and assistance of a block managers' assembly. Under the War Relocation Authority regulations, Local government was not provided at the Tule Lake Segregation Center.

The community councils, together with other evacuee commissions and committees related to the community governments, have rendered much valuable service to the War Relocation Authority program. At several centers, they provided outstanding assistance in the reception of evacuees transferred from Tule Lake when it was converted into a segregation center, and from Jerome when that center was closed. They helped to stimulate relocation by conducting surveys, transmitting information, and facilitating the work of the relocation teams that visited the centers. When the reinstitution of Selective Service for Nisei was announced, they contributed to bringing about a better understanding of the War Department action by the people in the centers. They sponsored visits by Nisei war heroes, and supported the internal stability of the centers by negotiating for the evacuees in labor disputes, improving labor relations, and helping to meet critical manpower shortages.

Many problems of center operation have grown in acuteness as relocation and Army inductions have drawn away the younger residents and professional people. However, all divisions and sections of the War Relocation Authority cooperated in the major program of the agency to relocate people outside the centers as rapidly as possible without allowing any service essential to the life of the communities to lapse.

Among the activities affected by serious manpower shortages was the agricultural program which is designed to produce as much as possible of the food required by the residents of the centers. In spite of the loss of agricultural workers, however, only one center—the Granada Relocation Center in Colorado—was forced to curtail production. More than 7,500 acres of vegetables were planted and harvested at all of the centers. The meat production totaled 2,373,829 pounds of pork and 1,283,824 pounds of beef. An estimate of the value of all the food produced was placed at \$3,089,606.

Many competent workers in the business enterprises—accountants, storekeepers, beauty operators, shoe repairmen, laundry workers, dry cleaners and others—were also lost when they departed to accept employment in outside communities where they could make more profitable use of the skills and experience that they acquired in the centers. These business enterprises are maintained by the evacuees on a cooperative basis to provide the residents with essential goods and services not included in the basic needs supplied by the Federal Government.

Insofar as possible, all employment in the centers is designed to provide the workers with training and experience which will help

them to enter gainful occupations when they relocate. Agricultural and community enterprises have been especially helpful stepping stones to employment outside the centers. Other skills that find a ready market are developed by several community industries—particularly the garment and mattress factory at Manzanar and the silk screen poster shop at Granada. In the 12 months before July 1, 1944, 25,630 garments and 4,020 mattresses were manufactured in the former center, and 47,701 posters were produced at Granada chiefly to fill orders for the Navy. Also produced for the Navy were 67 ship models, including two large-scale models turned out by the evacuee shop at the Gila-River Center. Furniture and food products were made at all of the centers.

Two major aims were stressed by the education program in the centers: (1) to provide standard elementary and secondary schooling for the evacuee children, and (2) to make available to the adults courses to prepare them for successful relocation. The inability of many of the older Issei to speak English has been one of the most serious handicaps retarding their relocation. To overcome this obstacle, special English courses were offered and practice exercises in speaking English were introduced into adult education classes at the relocation centers. Special courses in American customs, home-making, and various vocations were offered to develop interest in relocation, to prepare the older people to participate in community life outside the centers, and to equip them to earn their livelihoods. There were 10,175 people enrolled in adult education classes in May 1944; 2,779 in English courses, 1,186 in vocational courses, and 6,210 in other courses related to the orientation program.

The elementary and secondary schools also participated in developing interest in relocation through special projects in civics, history, and kindred subjects. The total regular school enrollment in May was 20,907.

Health conditions at the centers were generally good. There were no major epidemics; the deaths numbered 623, and the births 2,125. In the health and medical program, however, as in other essential programs in the centers, adjustments were necessary to maintain adequate services in the face of personnel losses. Only 30 evacuee physicians, most of them elderly men and some on duty only part time, remained in the centers at the end of the fiscal year. Relocation and Army inductions took 22 others who had been employed at the beginning of the period. This loss necessitated the appointment of 8 additional nonevacuee physicians, increasing the appointed staff to 20. The shortage of evacuee nurses was even more acute. Only 7 remained on June 30, 1944, and the recruitment of nonevacuee nurses to fill vacancies proved exceedingly difficult.

Average bed occupancy in the hospitals increased approximately 20 percent, owing in part to a gradual accumulation of tuberculosis patients, and in part to the need of providing care for elderly persons left behind by younger family members who relocated. Custodial barracks under minimum medical supervision were opened in several centers to provide care for them.

General maintenance costs were sharply increased at all the centers, owing to the deterioration of temporary construction. The quantities of materials needed to repair barrack roofs and to replace the tar paper used to cover the outside walls increased greatly. Many interiors required additional material to maintain them in livable condition. Lack of foundations caused many structures to settle; inferior lumber warped and cracked. Overcrowding in small apartments also brought about considerable damage.

Other maintenance troubles centered in the water systems which were often constructed of second-hand material. Old water mains sprang leaks; pipes and fixtures had to be replaced.

The problem of keeping motor transport equipment in operation was especially critical. Evacuees skilled in automotive repair work were among the first to relocate, and replacements from the center population were almost impossible to find. Additional difficulties arose from the scarcity of material and parts to make repairs of any kind.

The highly inflammable character of the construction at all the centers, and the dryness of the climate in which most of them are located, make for heavy fire hazards. On Christmas Day, a fire at the Colorado River Relocation Center resulted in the destruction of property valued, according to estimates, at about \$42,000. The major loss was suffered by the evacuees whose furniture and personal belongings were stored in the buildings consumed. On March 5, a \$16,000 fire occurred at Gila River. On both occasions, water shortages seriously hampered the fire fighters. Two other fires that caused damage in excess of \$5,000 in each instance occurred at Colorado River and Tule Lake.

All problems of center operation are bound to become more acute as the progress of relocation takes from them the younger, abler members of the communities, and as the physical equipment deteriorates with age and use. These problems have been frankly viewed by the War Relocation Authority which will continue to meet them with the best resources at its command.

LITIGATION

Two court cases of interest to the War Relocation Authority arrived at new developments during the 12-month period. In December, the Ninth Circuit Court of Appeals sustained the conviction of Fred T.

Korematsu for violating Civilian Exclusion Order No. 34 issued by the commanding general of the Western Defense Command. This decision held valid the evacuation and exclusion program. At the end of the fiscal year, the case was pending before the Supreme Court of the United States which had granted a writ of certiorari to review the lower court's decision.

The second case had to do with a petition for writ of habeas corpus filed by Miss Mitsuye Endo who originally sought to obtain release from the Tule Lake Center. When Tule Lake was converted into a segregation center, she was transferred to the Central Utah Relocation Center. This case was complicated by the fact that Miss Endo had been granted leave clearance. She was free to leave the center at any time by complying with the general provisions of the leave clearance regulations which require all evacuees who relocate to offer evidence that they can support themselves outside the centers, and to agree to report changes of address. These provisions she refused to accept.

When a Federal District Court in California denied the writ, Miss Endo appealed to the Ninth Circuit Court which considered the case but did not decide it. Instead, the Circuit Court certified to the United States Supreme Court four questions bearing on the validity of the War Relocation Authority leave regulations. This case was on the calendar of the Supreme Court at the end of the fiscal year.

EMERGENCY REFUGEE PROGRAM

On June 9, a new responsibility was given to the War Relocation Authority when President Roosevelt announced that the agency would be placed in charge of an emergency shelter at Fort Ontario, N. Y., for approximately 1,000 European war refugees. Plans to receive the refugees were under way at the end of the fiscal year. A director for the shelter had been named, and steps had been taken to organize the personnel necessary for its operation.

CONCLUSION

The objective of the War Relocation Authority, with regard both to the evacuees and the refugees who have been, or may be, placed under its supervision, is to hasten in every available way, through the direct use of its own resources and in cooperation with other agencies, the termination of the conditions that require the maintenance of Government projects to care for these people. The War Relocation Authority program is an emergency program which should be completed and liquidated as rapidly as possible. It should not be continued into the post-war era.

Board on Geographical Names

MEREDITH F. BURRILL, Director



GEOGRAPHICAL names, recognized to be important tools of war, may be equally important instruments of peace. Attu, El Alamein, Guadalcanal, Salerno, and Tarawa, little known in this country 2 years ago, have become bywords. Tomorrow the peoples of the world will be tied together by even faster communication and an even greater number of common objectives. In post-war international trade and travel, consistency in geographical nomenclature will be as necessary as in time of war, and the names of far-distant cities will be as familiar as our own.

The Board on Geographical Names, in seeking and finding answers to the multiple problems of place names all over the world, is contributing to the peace as well as to the winning of the war. Although this emergency often has made necessary the adoption of principles emphasizing speed and quantity more than precision in the treatment of names, the overwhelming share of the Board's work will stand the test of peacetime requirements. With but few exceptions, the problems of geographical names, once they are solved, need never again hamper either the defense or the commerce of this Nation. Reorganized shortly before the beginning of the fiscal year, the Board has made rapid strides toward securing uniformity of name usage by Federal agencies, its basic function which it could not perform properly before for lack of staff and source materials. In the more than 50 years since the establishment of the original Board, a total of about 25,000 name decisions had been rendered, about one-fifth of which were foreign names. The simple rules covering foreign names laid down years ago have proved to be basically sound but inadequate for large-scale mapping. Proper application of these very general rules to the complex problems of geographical names in diverse countries without

further assistance from the Board would have required each agency using such names to make exhaustive studies. They were not prepared to do this, and consequently there was wide variance in names on the Federal maps and charts of foreign areas.

Much of the early part of the present year was spent in recruiting and training an adequate staff, developing techniques and procedures, and collecting and evaluating source materials. The Board now has a highly competent professional staff including geographers, linguists, and other experts brought together in the face of insistent doubts that such a technical group could be assembled at a period when competition for such services was necessarily great. The Board has collected and cataloged a library of over 100,000 maps and 12,000 textual sources which make this source-materials library the finest in the Western Hemisphere dealing exclusively with the problems of geographical names. Most of these sources have been contributed by persons and offices vitally interested in place-name problems.

During the fiscal year the Board has increased the output of decisions one-hundred-and-forty-fold over the yearly average of the last decade and has provided detailed directions for treating names in a large number of foreign areas, emphasizing those of greatest military importance. These directions have made possible a consistency of usage among map makers not otherwise obtainable and have enabled military map makers to compile maps not simply with names but with the best names that can be had in the absence of decisions. The Board has compiled finding lists for the rapid identification of more than 500,000 places and features on military maps. Hundreds of thousands of individual place names have been checked and corrected, in advance of publication, on maps and strategic intelligence and planning materials where consistency and good name-usage have contributed to the usability of military information.

The Board has established and maintained an information service that has assisted in the answering of individual place-name inquiries from more than 50 Federal war agencies and offices. By doing this kind of work for all, the Board has not only provided the best of such information and reduced confusion and delay but also has done so at a fraction of the cost in time, money, and manpower which would have been required if individual agencies had been forced to do this work for themselves.

The fund of experience necessary in carrying on this place-name work which has been accumulated is highly important for the future. Aside from the work of private individuals on a small number of specific problems and the relatively small amount of this kind of research previously carried on by the Board, there was extant in this country relatively little published work or experience dealing with place names as an integral part of map production and much of this

was not available to all compilers of maps and intelligence. The basic research which has been and is being carried on by the Board is making generally available adequate sources for names of literally millions of places and features.

The Board is in a position to render real and significant service to the Government and thus to individuals. Furthermore, it is much cheaper for one Government agency to maintain a central collection of place-name information than for each agency to maintain its own, and the same names—the right names—will be used on all Federal maps and publications in wartime and in peacetime only if all Federal agencies use the same source. This source can continue to be provided, as it is being provided, by the Board on Geographical Names.

Office of the Solicitor

FOWLER HARPER, Solicitor¹



THE Solicitor's office has concentrated during this fiscal year on aiding the Department to carry on its threefold work of supporting a war, preparing post-war action, and protecting the Nation's resources for their best long-term use. Achievements have been significant despite the complications of a wartime economy, of the new laws called forth by that economy, and of the constant need to reckon with post-war changes.

Wartime controls.—Certain activities are exclusively “for the duration.” Among these is civilian explosives control by the Bureau of Mines under the act of December 26, 1941. Greatly needed as part of this control were explicit regulations on the storage, handling, and transporting of explosives. These were drafted by the Mines Division of this office. The burden of the division's work, however, lay in the enforcement of the act and regulations, and a number of license revocations and convictions resulted. Troublesome questions of conflicts of powers and duties between State and Federal officers were solved and model State explosives laws were prepared for submission to the States holding regular legislative sessions.

Among the most urgent and novel war problems were those incident to the possession of the coal mines under the Executive orders of May 1 and November 1, 1943. Within the framework of principles and procedures mapped out for the handling of this emergency by the Solicitor's office, the Legal Division of the newly created Coal Mines Administration worked out the necessary orders, instructions, and instruments of operation and assisted in the conduct of litigation, as well as in negotiations leading to the termination of outstanding disputes and the return of the mines to private operation.

The Legal Division of the Solid Fuels Administration for War also operated as an integrated part of that administration. In perform-

¹Warner W. Gardner served as Solicitor until his military furlough on August 31, 1943. J. S. Cohen served as Acting Solicitor until Mr. Harper's appointment on September 7, 1943.

ing its main job of devising legal mechanisms for obtaining a fair and equitable distribution of the limited supplies of coal and other solid fuels, the division drafted the regulations and orders, organized industry advisory groups, and passed upon almost all proposed actions of the agency.

With the transfer to the Department of the War Relocation Authority on February 16, 1944, the Solicitor's office inherited a series of pending cases and problems raised by the enforced detention of over 100,000 persons, two-thirds of whom are citizens. Important aspects of the constitutional questions are now before the Supreme Court. At the same time this office found itself faced with the many-sided legal tasks of that authority in furnishing advice not only to the administrators, particularly with respect to hearing procedures used in segregating the disloyal, but also to the community organizations of the relocation centers, and to individual evacuees, particularly with respect to their abandoned property.

Public lands and resources.—Nowhere is the double objective of full wartime use and long-term conservation of the Nation's resources more in evidence in the legal work of the Department than in that performed for the agencies engaged in the administration of the public lands. In carrying out the war programs of the General Land Office, Geological Survey, and the National Park Service, the legal divisions of those agencies and the Public Lands Division of this office have aided in the withdrawals of public land, now amounting to over 16 million acres, for war purposes, and the utilization of the public land by lease and permit for the extraction of critical minerals, oil and gas, timber, and other products and for the location of military facilities. Similarly, the Conservation Division of this office and the Legal Division of the Grazing Service have passed upon the utilization of grazing land for military purposes and greater food production. Over 1,600 war emergency licenses for additional grazing have been issued following the determination by the Conservation Division of the authority therefor.

In line with the great increase of unit plans in oil and gas production since Pearl Harbor, the Public Lands Division and the Legal Division of the Geological Survey gave frequent consideration to unit and cooperative agreements, particularly for the development of wildcat areas to discover new reserves, for cooperative drilling arrangements to conserve materials, and for protection against drainage of deposits. Oil and gas rights were the subject of most of the important court cases handled by the Public Lands Division either directly or by furnishing assistance to the Department of Justice. Of the cases thus far decided, the United States has been successful in all except the litigation over oil rights in Los Cerritos Channel, Calif. The Public Lands Division also took part in the Department's con-

sideration of a domestic military oil reserve program. In anticipation of post-war large scale coal mining operations in Alaska, the coal mining regulations of the Geological Survey were amended to apply to that territory.

The Public Lands Division notably protected the permanent interests of the Nation when it discovered that certain ancient "forest lieu selection rights" offered for the purpose of acquiring surface title to potash lands for lessee potash companies and valuable timber lands were invalid. The Property Acquisition Division of this office assisted in the acquisition of extensive new acreage in its approval of title to over 25,000 acres acquired under the Taylor Grazing Act in exchanges which have aided consolidation of grazing lands, of over 263,000 acres acquired under the Forest Exchange Act, and of over 800,000 acres acquired for national parks. The exchanges of land for timber under the Forest Exchange Act, reviewed by that division, have facilitated the movement of timber for war purposes. The passage of Public Law 273, largely drafted by the Legislative Division of this office, has provided the Department with an important conservation mechanism in establishing the principle of sustained-yield forest management on federally owned lands and providing effective means for enlisting cooperation of private land owners.

Mineral development.—In aid of exploration by the Bureau of Mines for critical and strategic minerals, the Property Acquisition Division, through field attorneys, determined the ownership of the land being explored, and drilling contracts were made in the light of advice and instructions from the Mines Division. In aid of the experimentation by the Bureau for new or more efficient metallurgic processes, the Property Acquisition Division assisted in the acquisition of new plant sites and buildings and the Mines Division prepared the contracts for construction, supply, and operation of these facilities. By the same division of work, plants and rights-of-way were acquired for the vast expansion of the Bureau's helium production, and construction, supply, and operation contracts were executed. To enable the Bureau to undertake practical experiments in the production of synthetic liquid fuels from shale, coal, and natural gas the Legislative Division prepared legislation which became Public Law 290, authorizing demonstration plants. The problem of securing repayment to the Federal Government of expenditures to be made in the construction of the Leadville Drainage Tunnel, designed to dewater some of the richest lead and zinc mines in the country, was referred to the Solicitor's office at the beginning of the fiscal year. It was solved through the drafting and negotiating of royalty contracts which, by the close of the fiscal year, had been executed by nearly all of the operators benefiting from the project.

Reclamation and power.—Important blue prints for post-war use of land and water resources were drawn up in the legislative program of the Bureau of Reclamation with the aid of attorneys in the Legislative Division and of the Legal Division of the Bureau. This program included the Central Valley Soldiers Settlement Bill, now before Congress, providing a plan for the settlement of soldiers on lands receiving water under that project, authorization for the post-war construction of the Hungry Horse project (Public Law 320), and amendments urged to the pending rivers and harbors and flood control bills. The construction program for immediate war food purposes was forwarded by the passage of Public Law 152, drafted by the Department's attorneys, designed to increase food production through small reclamation projects, and by the negotiation of construction and supply contracts under seven war food projects reapproved by the War Production Board. The Bureau's Legal Division with the advice of the Conservation Division drafted important power contracts, particularly for the sale of energy from Boulder and Shasta Dams. An understanding was reached with the Bonneville Power Administration for the marketing of energy from the Grand Coulee Dam and a return of part of the Government's investment out of the power revenues. In the settlement of problems relating to the apportionment of waters, of particular note was the negotiation of the Belle Fourche compact between the States of Wyoming and South Dakota, ratified by Public Law 236. The apportionment of the North Platte River is now pending in the Supreme Court in the case of *Nebraska v. Wyoming and Colorado*, in which Bureau attorneys gave active assistance.

Territories.—Political and economic questions of major importance to the Territories demanded intensive consideration from this office, particularly from the Legislative Division, and from the legal staff of the Division of Territories. Assistance was given to the President's Committee set up to study further autonomy for Puerto Rico, in the preparation of legislative recommendations designed to achieve that objective, and to the congressional committees studying basic conditions in Puerto Rico. An Executive order was drafted to coordinate Federal activities in Puerto Rico. War and post-war economic measures for Puerto Rico which demanded attention included arrangements for the procurement and distribution of food, the consolidation of power and water facilities to meet military and post-war industrial needs, and the more equitable distribution of petroleum products. As the tides of war moved westward in the Pacific, new steps were taken toward completing the elimination of martial rule in Hawaii. Measures for the Virgin Islands included extension of social security services and Federal credit, and legislation for a public works program. Measures for Alaska included proposals for homestead opportunities for veterans and other settlers, for a development company to promote

post-war industrialization, and for the resettlement of evacuated natives. Legislation for post-war development of the territories was studied which became Public Law 320, amending the Hawaiian Homes Commission Act; Public Law 236, the so-called G. I. Bill of Rights, in which amendments were inserted to provide adequately for the returning veterans of the territories; and Public Laws 380 and 381, establishing a policy for Philippine independence and a commission to consider rehabilitation of the Philippines.

Fish and game.—The enforcement by the Office of the Coordinator of Fisheries of the orders of the Secretary for more effective use of fishery resources during the war required constant negotiation by the chief counsel of that office with interested parties, and, in connection with the pilchard program, the institution of 21 administrative proceedings against violators of the orders. The Conservation Division and the chief counsel, in cooperation with other officials of the Fish and Wildlife Service, drafted amendments and extensions of the departmental orders relating to the pilchard industry, the allocation of salmon in Alaska, the regulation of the salmon canning industry in Alaska, and the regulation of salmon operations in the Puget Sound area. Major conservation legislation drafted by the Legislative Division became Public Law 106, revising the Alaska Game Law to strengthen game control and extend protection to inland fishes, and Public Law 237 effectuating the 1942 provisional Fur Seal Agreement between the United States and Canada. The Conservation Division and the chief counsel of the Fish and Wildlife Service revised the regulations under the Alaska Game Law to effectuate Public Law 106 and the Alaska commercial fishery regulations to permit a maximum take this year. The chief counsel aided the temporary transfer of 400,000 acres to the military services, worked with the Office of Price Administration in preparing maximum ceiling price regulations for the raw fur industry, and drafted conservation agreements with other American Republics.

Indians.—Protection of Indian rights was the chief occupation of the Indian Division of this office during the past year. Litigation to eject trespassers who had for many years maintained ranches on the Pyramid Lake Indian Reservation in Nevada was brought to a successful conclusion when the Supreme Court declined to review the decision favorable to the Indians in *Depaoli v. United States*, 139 F. (2d) 225, cert. den., 321 U. S. 796, and the trespassers agreed to sell their improvements to the Pyramid Lake Tribe. Litigation against some 800 lessees in the Town of Salamanca, New York, who had defaulted in rentals due under long-term leases executed more than 50 years ago by the Seneca Tribe, resulted in nearly all of the defaulting lessees paying up the amounts due and entering new leases under which the Indians will hereafter receive rentals more commensurate with

the present value of the land. These two victories should go a long way toward commanding respect for Indian land ownership in quarters that have often considered Indian tribal lands as a kind of public domain open to all takers. Another old wrong was righted when, following a judgment in favor of the Menominee Tribe for \$1,700,000, the value of land promised the tribe in 1854 but never transferred to it, arrangements were completed for the use of this recovery to acquire the lands promised 90 years ago by a nation which still holds its word to be sacred. Further progress in the protection of Indian lands was made in Alaska, where a preliminary study of the status of Indian land claims resulted in the perfecting of arrangements for administrative adjudications of aboriginal claims within the public domain.

A large increase in important Indian litigation made necessary the assumption by the Solicitor's office of new responsibilities for brief-writing. Additional burdens were likewise cast upon this office in the field of taxation, where recent decisions have compelled reconsideration of various Indian tax liabilities under State laws. Further new responsibilities in the field of financing Indian land-use and industrial development were the result of congressional legislation at the start of the fiscal year extending the credit provisions of the Indian Reorganization Act to tribes which had not hitherto been entitled to the benefits of that act. Assumption of these new responsibilities was made possible by an extensive delegation of authority in other fields of Indian law and administration to the Indian Office and to the Legal Division of that office, on which have fallen greatly increased burdens, particularly in fields of land transactions, credit, law and order, and probate matters.

Government property and transactions.—To prepare for post-war property liquidation problems, the Legislative Division drafted a comprehensive bill, submitted to interested congressional committees, for the administration of surplus federally owned real property, and the Solicitor's office advised the Department's representative on the interdepartmental surplus war property committee. In the administration of the Department's order defining the Government's property interest in employee inventions, the Legislative Division drafted Public Law 357, authorizing the payment of rewards for inventions and suggestions, and the Mines Division prepared opinions on the relative rights of the Government and the employees, set up new procedures for reporting inventions to the Secretary and the Attorney General, and reviewed at least 109 new patent matters transmitted to the Department of Justice. The several divisions of the office, drafting, reviewing, and administering the contracts of the Department, studied and applied the numerous wartime Executive orders and in-

structions establishing contract procedures and provisions to meet critical labor and material shortages.

Departmental procedure.—To obtain more effective distribution and speedier conduct of the Department's business, the Solicitor's office was repeatedly called upon to analyze the Secretary's authority to delegate functions to the heads of agencies and to transfer functions among them. It drafted delegation opinions and orders concerning the Indian Office, Board on Geographical Names, General Land Office, Grazing Service, National Park Service, and the Bureau of Reclamation, and upheld the authority to transfer safety inspections of mines under Government lease from the Geological Survey to the Bureau of Mines and the authority to transfer, consolidate, and regroup, with one minor exception, all of the oil and gas functions of the Department.

Personnel organization.—To stimulate the interest of the Department's attorneys in the opportunities of Government service and in the possibilities for improvement of standards of work, the Solicitor put into effect a strict application of the Department's advancement-from-within policy and undertook the establishment of an in-service training program. Since January when advancement procedures were officially established, 13 of 17 vacancies have been filled from within the service. In organizing the in-service training program, as many as 20 different Government agencies were consulted. Courses are now planned, in cooperation with 13 other agencies, which will be open to lawyers newly entering the service, those in the service, and those returning from the armed forces.

The reorganization of the work of the office, previously approved, was carried on this year by the establishment of chief counsel positions in the Geological Survey, General Land Office, Grazing Service, and Office of the Coordinator of Fisheries, by the transfer of certain title work from the General Land Office to the Property Acquisition Division, by the reorganization of the Law Division in the General Land Office, and by the formal establishment of the fiscal and personnel law section in the Conservation Division.

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Division of Personnel

Supervision and Management

MRS. J. ATWOOD MAULDING, Director



THE conservation and full utilization of manpower have continued to be the objectives during the fiscal year 1944. In the development of programs toward these goals the Division has endeavored to strengthen the whole personnel structure in preparation for the tremendous post-war problems, such as post-war expansions, the returning veterans, and the demobilization of purely wartime activities.

The Division has continued the policy of searching the Department's own personnel for needed talent first, not only as a part of the recognized promotion-from-within policy, but to avoid as much as possible a drain on the outside manpower sources. This has resulted in filling from within the Department 60 percent of the vacancies above the entrance grade in the District of Columbia and 38 percent of those in the field. In the specialized war work, however, there has been a continuing demand for topographic engineers, geologists, engineering aids, and draftsmen in the Geological Survey; mining engineers, metallurgists, and coal mine inspectors in the Bureau of Mines; as well as special services in coal and other fields. The supply has not been adequate, which has made it necessary to request occupational deferment from military service for a number of those professional and specially qualified persons to carry on effectively the strategic work. Our requests for deferment have been principally in the 30 to 37 age group, interfering as little as possible with the military program.

Every effort has been made to recruit women and those not subject to military service. The fact that the Department now has approximately 9,600 women, nearly 3,000 more than at Pearl Harbor, points up this policy. At the same time the Department has released to the

armed services more than 6,200; 267 have returned to duty in the Department and 32 have paid the supreme sacrifice.

There has been a constant shortage of stenographers, typists, and other types of clerical help. As part of the effort to recruit them a joint recruiting program was arranged with the Civil Service Commission which was conducted in Virginia, West Virginia, and North Carolina. While productive it did not meet fully the demands. The help of the Department's own personnel in locating recruits has also been enlisted.

A broad training program has been conducted this year in an effort to increase the effectiveness of persons presently employed in the Department, to improve further the efficiency of our supervisors, and to orient new employees. In addition to refresher courses previously conducted for typists and stenographers, over 400 new employees have participated in the orientation program. Representatives from the bureaus in Washington, Chicago, Denver, and Salt Lake City took the trainers' course for job instruction training, which course they have given to over 200 supervisors in these cities. To provide a reserve from which to draw administrative talent the Department's administrative course was again given to carefully selected candidates. Three employees were also selected for the in-service administrative training program of the National Institute of Public Affairs.

Four separate promotional examinations were designed and conducted in the Division, in which 436 employees participated in Washington, Chicago, and Denver. These were for the purpose of establishing the eligibility of clerks for higher grade vacancies, and messengers for clerical positions.

The classification office has reviewed and allocated 16,700 positions during the year, and has made numerous surveys of groups of positions, some in collaboration with the Civil Service Commission. Specifications have been prepared and promulgated for various classes of field positions, as part of a long-range plan for covering by specifications all of our typical field positions.

Consonant with the Stabilization Act the Division has endeavored to keep rates of pay for the trades and occupations at the prevailing level and wage board procedures have been extended to accomplish this.

Even under the abnormal conditions of wartime every evidence is that the morale of the Department's personnel is high. Information regarding recreational opportunities, housing, child care and so on has been disseminated; by cooperation with the Public Health Service chest X-rays were made available on a voluntary basis; health lectures were held; the welfare and credit union services have been available. While turn-over has been above normal, we have found very few individual grievances.

In order to give improved and more expeditious service to the three bureaus of the Department which were transferred to Chicago in 1942, a branch office of this Division was established there in January 1944. The results of bringing the departmental staff closer to the operating officials has been most gratifying.

During the fiscal year there were 18 retirements for age, 74 optional, 43 for disability. There were 21 employees reemployed after having reached the retirement age.

At the close of the fiscal year there were 43,879 employees in the Department, 4,858 in the Washington metropolitan area, and 39,011 in the field.

As part of an improved over-all program of the Division, plans have been going forward looking to more decentralization of paper work and the placing of more responsibility on the bureaus and offices, while retaining central control over policies and sound personnel standards and procedures. The first major delegation of authority was made in May 1944, to the Bureau of Reclamation in Denver. Others are in process. The Division is girding itself for the challenging tasks ahead.

Interior Department Museum

H. L. RAUL, Museum Curator



WITH vast national resources under the administration of the Department of the Interior and directed toward sure victory and post-war requirements, the vital contributions of the Department to these ends are illustrated graphically in the Interior Department Museum. The museum, operating in direct contact with the public, reflects the history, aims, and the current activities of all of the bureaus of the Department.

Its educational character is well attested by the popular use made of the museum by the general public, members of the armed forces, educators, and students.

The museum was visited during the past year by approximately 45,000 persons. The visitors' register recorded visitors from every State in the Union with the single exception of Nevada. Registrations were received also from Alaska, Hawaii, Puerto Rico, Argentina, Australia, Canada, China, Colombia, Cuba, England, Ecuador, France, Haiti, Holland, Iceland, Italy, Mexico, Mongolia, New Zealand, Scotland, Sumatra, Sweden, Switzerland, Panama, Paraguay, Thailand, Venezuela, and Yugoslavia.

In cooperation with the bureaus, revisions have been made in the display cases to reflect current conditions. During the past year the museum has served, upon request, numerous agencies including American Air Forces, Corcoran Gallery of Art, Fort Belvoir Engineers' Board, National Institute of Public Affairs, Navy Department, Public Buildings Administration, State Department, United States Service Organizations, Veterans' Administration, and the War Department.

A collection of antique Indian baskets, selected from the Colburn Collection of Indian Basketry, was exhibited, by request, at the Toledo (Ohio) Art Museum during the month of January. This exhibit proved its popular interest by a granted request for extension of the exhibition period for an additional month.

A silhouette, which is ten feet in length and which depicts "The Driving of the Golden Spike" at the completion of the first trans-continental railroad, at Promontory Point near Ogden, Utah, on May 10, 1869, was designed in the museum and installed in the General Land Office Gallery. Books added to the museum collection include *A Manual on the Origin and Development of Washington*, by H. Paul Caemmerer, Ph. D.; *The Crafts of the Ojibwa (Chippewa)*, by Carrie A. Lyford; and *Seneca Split Basketry*, by Marjorie Lismer.

Throughout the year conducted tours of the museum galleries were held for teacher groups and public and private school classes. A pertinent commentary on the educational value of the museum is indicated by the continuous use of the galleries for school purposes. Notwithstanding transportation difficulties which frequently prevented entire school classes from attending, the teachers visited the museum, singly and in groups, to avail themselves of material for arranging study courses on conservation, historical and other subjects pertaining to various activities of the Department. Numerous inquiries on the part of the general public have been complied with daily at the information desk. Many requests have been received from visitors in the uniforms of our armed services.

POST-WAR

In connection with post-war potentialities of the museum, certain improvements are desirable. The museum specimen collections have been largely augmented during the past several years. Much of this important new material now is held necessarily in storage, and, therefore, is not readily available for display or study purposes. Additional space will be needed to provide for these collections and for other important exhibit material. Furthermore, while present display cases currently are subject to additions and revisions to reflect the current bureau activities, space restrictions are evident.

As during the course of the war the facilities of the museum have been made available for the training of hundreds of departmental personnel in modern first aid techniques, developed and taught by the Bureau of Mines, a post-war expansion of the use by the bureaus of the museum facilities and equipment is suggested, should the need arise, in connection with possible post-war training and rehabilitation programs for returning war veterans, particularly those who were past employees of the Department. In this field the museum technical workshop could well serve as a nucleus for training courses in expert model-making, visual and graphic techniques, and other specialized training useful both to the veterans and to the Department.

From the post-war historical standpoint, when victory is won, many of the museum displays will require final revision and re-designing to illustrate and record the vital importance and the amazing scope of essential activities accomplished by the Department and under its auspices in the prosecution of the war. Post-war potentialities for the museum indicate that when the full story of the Department's participation in this great crisis in the life of our Nation can be unfolded in its entirety, by modern museum methods, this new great chapter in the history of the Department appropriately will require increased exhibit space for its presentation. It will comprise an inspiring story of vast achievement in many fields vital to victory. In reflecting this story for permanent visualization and reference, desirable post-war museum results are anticipated for the Department and for the public.

A silhouette, which is ten feet in length and which depicts "The Driving of the Golden Spike" at the completion of the first trans-continental railroad, at Promontory Point near Ogden, Utah, on May 10, 1869, was designed in the museum and installed in the General Land Office Gallery. Books added to the museum collection include *A Manual on the Origin and Development of Washington*, by H. Paul Caemmerer, Ph. D.; *The Crafts of the Ojibwa (Chippewa)*, by Carrie A. Lyford; and *Seneca Split Basketry*, by Marjorie Lismser.

Throughout the year conducted tours of the museum galleries were held for teacher groups and public and private school classes. A pertinent commentary on the educational value of the museum is indicated by the continuous use of the galleries for school purposes. Notwithstanding transportation difficulties which frequently prevented entire school classes from attending, the teachers visited the museum, singly and in groups, to avail themselves of material for arranging study courses on conservation, historical and other subjects pertaining to various activities of the Department. Numerous inquiries on the part of the general public have been complied with daily at the information desk. Many requests have been received from visitors in the uniforms of our armed services.

POST-WAR

In connection with post-war potentialities of the museum, certain improvements are desirable. The museum specimen collections have been largely augmented during the past several years. Much of this important new material now is held necessarily in storage, and, therefore, is not readily available for display or study purposes. Additional space will be needed to provide for these collections and for other important exhibit material. Furthermore, while present display cases currently are subject to additions and revisions to reflect the current bureau activities, space restrictions are evident.

As during the course of the war the facilities of the museum have been made available for the training of hundreds of departmental personnel in modern first aid techniques, developed and taught by the Bureau of Mines, a post-war expansion of the use by the bureaus of the museum facilities and equipment is suggested, should the need arise, in connection with possible post-war training and rehabilitation programs for returning war veterans, particularly those who were past employees of the Department. In this field the museum technical workshop could well serve as a nucleus for training courses in expert model-making, visual and graphic techniques, and other specialized training useful both to the veterans and to the Department.

From the post-war historical standpoint, when victory is won, many of the museum displays will require final revision and re-designing to illustrate and record the vital importance and the amazing scope of essential activities accomplished by the Department and under its auspices in the prosecution of the war. Post-war potentialities for the museum indicate that when the full story of the Department's participation in this great crisis in the life of our Nation can be unfolded in its entirety, by modern museum methods, this new great chapter in the history of the Department appropriately will require increased exhibit space for its presentation. It will comprise an inspiring story of vast achievement in many fields vital to victory. In reflecting this story for permanent visualization and reference, desirable post-war museum results are anticipated for the Department and for the public.

Division of Information

JOHN E. RYCKMAN, Director



DURING 1944 the Division of Information has endeavored to keep the public abreast of what the Department, as custodian of the Nation's natural wealth, has done, not alone in mobilizing our resources for war, but in planning for the post-war period.

The informational programs of the various Bureaus and Offices having to do with the development and wise use of such natural assets as metals, power, fuel, helium, food, land, timber, and fisheries, have been under the direction of this Division and channeled through it to the public. This Division is comprised of editorial, radio-television, photographic, and publications sections.

By appointment of the Secretary of the Interior, the Director of Information has acted as security officer for the Department in safeguarding secret and confidential material that might aid and comfort the enemy, as clearance officer for publications with the Office of War Information, and as editor in chief of the Interior War Records Project, now in the process of being compiled for the future use of the Government in time of emergency.

The Division has been responsible not only for passing upon the editorial content and format of pamphlets, booklets, and other publications released by the Bureaus but also for deciding whether such printed matter should be issued at all during the emergency. In this connection, considerable savings in vital paper stocks have been effected through abridging many publications and restricting others for which there is not a definite war need.

The fiscal year has seen the assignment to the Division of the task of producing "Inside Interior," a monthly publication designed to keep the Department's own employees informed about its activities, as well as to enable the more than 6,000 employees in the armed services to maintain contact with their former associates.

The Division was also responsible for editing, designing the format and supervising the printing of the Secretary's annual report.

RADIO-TELEVISION SECTION

Under the general supervision of the director of information, the radio-television section, operating the only modern broadcasting and recording studios in the Government, has in the past year been increasingly called upon to serve Federal war agencies.

Principal use of these facilities was made by the armed services for the preparation of special training programs, including electrical transcriptions, direct broadcasts, and the production of slide film and film strips. These training productions were for use in every theater of the war.

More than 200 hours of secret and confidential utilization of radio-television section facilities were spent in the production of special materials for the Office of Strategic Services and for the War and Navy Departments.

A total of 29 different languages have been used in productions put out in the Section in the past year and broadcast as a part of the psychological war activity.

Diplomatic representatives of all of the United Nations and many distinguished war visitors have been presented by direct broadcast and by radio transcriptions both to American and foreign audiences. Notable in this category were a special broadcast of the arrival in Washington of General Charles DeGaulle, prepared for European listeners; the dramatic swearing in of Sergio Osmeña as President of the Philippines; broadcast for European and American audiences of special interviews with His Royal Highness, The Amir Faisal of Arabia and his royal entourage; a special broadcast to the men of the Marine Corps by General Holcombe upon his leaving his position as Commandant of the Corps for special duty. Representative of the type of series broadcasts produced in the section were the 482 special broadcasts by electrical transcriptions made by the Free Thai Minister, Mom Rajawongse Seni Pramoj, and shortwaved to the people of Thailand.

While these special services are being rendered to war agencies outside of the Department, our own bureaus and offices have in no wise been neglected. Programs, transcriptions and special recordings have been made in this period for the Solid Fuels Administration for War, the War Relocation Authority, Petroleum Administration for War, Board on Geographical Names, Bonneville Power Administration, Bureau of Reclamation, Bureau of Mines, Division of Territories and Island Possessions, Coordinator of Fisheries, National Park Service, and Geological Survey.

Within the past year, the radio-television section has cooperated in the preparation or production of radio and transcription material with most of the Federal departments and other agencies.

PUBLICATIONS SECTION

This is the first complete fiscal year during which the publications section has concentrated upon editing and publishing rather than upon the procurement of printing. Copy has not been merely prepared for the printer. It has been examined editorially, and faulty manuscripts have been revised or returned to the issuing agencies for corrections. This change in practice has been justified by the results, one of which is that the public receives clearer and better-selected reports of the Department's findings.

The section chief has assisted in effecting clearance of publications, under the Office of War Information Regulation No. 8 and has also assumed greater control over all departmental and bureau publications as regards format. Economic practices in the printing and processing of all information material have been enforced and appreciable economies have resulted.

Much remains to be done in improving the appearance and the editorial content of our publications, and it is planned to make such improvements as rapidly as circumstances permit.

PHOTOGRAPHIC SECTION

Most of the offices and bureaus of the Department have continued to utilize the facilities of the photographic laboratories to effect considerable savings in descriptive matter in official reports. The photographic section has devoted its time almost exclusively to furnishing photographs and illustrations having a direct bearing upon activities related to the war.

In addition to work for the Department, it has continued to cooperate with other governmental agencies in the production of illustrative material involved in their war programs. It has also furnished pictures for textbooks, guidebooks, pamphlets and travel literature requested by scientific, trade and other magazines and publishing organizations.

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Victory

Edition

Annual Report

OF THE SECRETARY OF THE INTERIOR

1945

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ANNUAL REPORT

OF THE

SECRETARY

OF THE INTERIOR



FISCAL YEAR ENDED JUNE 30 1945

UNITED STATES DEPARTMENT OF THE INTERIOR

Harold L. Ickes, Secretary

**UNITED STATES
GOVERNMENT PRINTING OFFICE
WASHINGTON : 1945**

For sale by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C.
Price 50 cents

FEB 15 '46

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LETTER OF TRANSMITTAL

THE SECRETARY OF THE INTERIOR

HAROLD L. ICKES, *Secretary*



MY DEAR MR. PRESIDENT: This annual report seeks to show how the mobilized resources of this Nation contributed to victory over the Axis nations. It also reveals how near that victory came to being a Pyrrhic one.

At the beginning of the period here covered we were still searching the earth for the minerals that were needed in ever-increasing quantities to equip our own fighting forces as well as those of our allies. While we were searching for these minerals with meticulous diligence we were spending them with wanton prodigality.

By the end of the period of this report our natural resources had been tapped, processed and sent to the battlefields in such prodigious quantities that Nazi Germany already had collapsed, and Japan was about to do so.

But the drain on our national natural assets had been staggering.

Only nine of the major minerals remain in our known domestic reserves in great enough quantity of usable grade to last 100 years or more. Our known usable reserves of 22 essential minerals have dwindled to a 35-year supply or less. Our assured domestic deposits of petroleum would last from 14 to 20 years at our present rate of use, but our prospects of making good on some of our losses in oil are fairly good.

In some other fields of conservation, the damage of war has been just as real, though it may prove to be temporary, and certainly it has been less severe. We were obliged to complete our huge power-production facilities ahead of schedule to energize war plants where there was no comparable peacetime manufacture to sustain the plants after the war. We must find new markets for those facilities or suffer the consequences of unemployed power which is scarcely more healthful economically than are unemployed men.

The war has reduced much of Europe and Asia to such a shambles, physically or economically or in both respects, that great populations abroad cannot provide the essentials of existence for themselves.

But they must be maintained so that, if for no other reason, they can sustain our economy. We must provide these peoples with as many of their needs as we can provide, especially food. We equipped ourselves during the war to produce more food, but not enough more to meet the postwar demands at home and abroad. The inadequate expansion of our agriculture is just as certainly attributable to the war as is the increased demand for food. We had to put as little material and work as possible into irrigation facilities so that we could put as much as possible into dams and power plants that would produce fighting equipment.

It is only fair to interrupt this gloomy recital long enough to say that some advantages, aside from military victory, also came our way between the beginning of the war and my transmittal of this report. The danger of defeat sped our improvement of new methods of exploring for mineral deposits, and for processing ores.

We have acquired jurisdiction over the Continental Shelf, which is about 760,000 square miles of underwater land from which we may replenish some of our depleted mineral reserves. Other Federal agencies have discovered or improved certain techniques and devices, radar among them, that will enable us to explore the shelf and to extract its riches more quickly than we could have hoped to do had science developed at its peacetime pace. We have several advantages in the programs which this Department formulated for the express purpose of regaining our balance in conservation after victory. We have begun an accounting of the minerals that we still have in our reserves, and when the tally is complete it will be as valuable to us as a clear statement of its assets would be to a corporation. We have made studies that show what the prospects of success are for various industries that might buy and use the power that we produce when war contracts are cancelled. These studies, which were made in co-operation with other Federal agencies, States, municipalities, colleges and industries, tell prospective contractors for our power which raw materials would be available to them, in what probable quantities, at what probable prices, what markets they might expect, and many related facts which may hasten the sale of power by facilitating the prospective buyers' preliminary surveys. We have already contracted for the sale of some power and the outlook for additional contracts is not discouraging. Within the past fiscal year, also, we have made much headway toward achieving regional development.

This is about as accurate as so brief a statement of our principal gains and our principal losses could be, but we cannot use it as a balance sheet. The losses that are listed are indeed losses; the ores that we have taken out of our mines will not creep back into the ground, but the "gains" are not so conclusively gains. Oil deposits in the Continental Shelf remain an unknown factor. We will have

to make a survey to find them. Processes for beneficiating low-grade ores will not, of their own accord, extract an ounce of metal, and many of the other "gains" that I have listed are equally inconclusive. They are merely potential gains. We can use them to our advantage or we can let the opportunity to use them escape us. I hope that a more detailed view of what is left of our diminishing resources will convince all of us that we must make amends for our losses by squeezing the last drop of advantage out of every potential gain that we have at hand.

The nine minerals that are plentiful enough in our known domestic reserves to last 100 years or more at a normal rate of use, are iron ore, nitrogen, magnesium, salt, bituminous coal and lignite, phosphate rock, molybdenum, anthracite, and potash. There are only nine of them out of the long list of metals that we must get at home or abroad in quantities as great as we need in order to hold our high place among the nations.

Even if we had a hundred years' supply of all of the metals that we need, that would not mean that we would be safe for a century. In the games of war and trade which nations play, a century is only a little while. Military and economic campaigns have been planned that far ahead. Consequently, it behooves us to learn the true meaning of our meager supply, which is not that we will be weak in a hundred years, but that we are relatively weak now.

Neither does the possession of a particular metal in great quantity guarantee that we can have all of the products that can be made of that metal so long as it lasts. We must have, in addition, the alloys that go into those products. Manganese is just as important as iron is in the making of most steel, and we have only a 2-year supply of usable manganese ore in our proved domestic reserves. So are vanadium and tungsten as necessary as iron is in making certain steels that are essential in time of peace or war; but we have in our proved domestic reserves only a 7-year supply of vanadium, and a 4-year supply of tungsten. We have less than a 35-year supply of 19 other minerals; among them, petroleum, copper, lead, tin, zinc, nickel, bauxite, chromite, and cadmium. Our reserves of high-grade coking coal are low. We do not know just how low because our knowledge of reserves is not yet so extensive as it should be. Our highest-grade iron ore, the kind that can be mined and smelted most cheaply, would be exhausted in about 22 years at a normal rate of use.

The past has not taught us how severely we can be penalized for a lack of metals at the outbreak of a war. It has taught us only that such a dearth can put us to a severe test. That is the worst that has happened to us; because we have always had time between the threat of war and actual war to get the materials which we lacked, or to

find substitutes for them. But we cannot henceforth count on any appreciable lapse of time between the threat and the event of a war.

Neither has the past taught us how terribly we could be made to suffer, from a scarcity of minerals, even in time of peace. We have never had to use substitutes for the commonest metals, nor have we paid unbelievable prices for such necessities as automobiles and refrigerators. But that is what we would have to do if we used the last of our high-grade ores, and had to import metals over great distances or extract them from our own submarginal reserves. Transportation of heavy goods is costly. So is the treatment of low-grade ores, and the consumer would pay the cost. I think that most Americans would like to see us take preventive measures against these threats while there is still time and I urge the necessity for it.

Many of the measures that would conserve the minerals that we have, or give us access to a larger supply, are very well known. We should stockpile; that is, we should import emergency supplies of metals that are scarce here, and store them, and we should add to that reserve from our own surpluses whenever we produce metals in greater quantity than we use them. We should intensify our explorations for new reserves. Improved instruments and methods would make our explorations effective and relatively cheap.

We should intensify our experiments in extracting metals from low-grade domestic ores by means of new and improved processes. If we wait until our high-grade ores are gone, and only then begin to use those of low-grade, processing will be very costly and uncertain of profitable results. If begun in advance of actual need, most experiments are not gropings after undreamed of methods. They are, instead, very practical proceedings by which well-known laboratory methods are improved enough eventually to make them profitable in large scale production. There is no mystery about how to make synthetic gasoline, for example. We can make it now, but the processing costs about 15 cents a gallon. Gasoline can be made from crude oil by means of a process that costs only about 5 cents a gallon. If we should drop our experiments in making synthetic motor fuel, and begin to produce it after our petroleum had vanished, by the methods which we know, every motorist would have to pay for a process that would be three times as expensive as that now in use. We should continue our experiments in all of our processes for beneficiating low-grade ores for the same reason: that we should continue our experiments with synthetic gasoline—so that they will be cheap enough to use when we have to use them.

We should also find more efficient methods of reusing scrap metals, find out how we can induce operators to take more oil from nearly dry wells, and act accordingly. We should regulate production methods so that waste in the process of mining will be minimized, and we

should do all that we can do to prevent the unnecessary use of our scarce and essential reserves. Our continued waste of natural gas is inexcusably profligate. Another case in point is coking coal, now being used where ordinary coal would be adequate, and which should be reserved for steel making, in which it is essential.

Above all we should act upon the advice of competent researchers, scientists, and technologists whose official business it is to keep us informed about which minerals we need and how to get them. No list of critical and strategic metals can remain accurate very long. A new alloy becomes indispensable, an old one becomes passe, a foreign source of supply becomes more accessible to us, and another becomes less so. Consequently, we cannot formulate any policy which would be applicable at all times and on all occasions.

The measures that I have recommended would help us to strengthen our position, but two other programs that are under way in this Department almost certainly will add more to our wealth and conserve our resources more effectively than any measures would that I have discussed thus far. These are a program for regional development and another for the exploration of the Continental Shelf. The concept and theory of regional development were discussed recently in hearings before a Senate committee, and these proceedings were published. Some of the facilities that could be administered in developing the resources of the Missouri Valley are under construction, and we are making studies that may result in the full and coordinated development of 14 other great river basins. News of these activities has been published, too. Consequently, there is relatively wide-spread understanding of what regional development is, of what is being done about it, and what it is intended to accomplish. But there has been almost no discussion of our impending exploration of the Continental Shelf, one of the Nation's most important acquisitions. If we discount the obvious fact it is uninhabited and uninhabitable, the Continental Shelf ranks with the lands which we acquired by the Louisiana Purchase, or by the opening of the West, or by the purchase of Alaska. And the exploration of this vast underwater area will be an important historical event. We will make new applications of modern science and set scientists to work in cooperation on a scope that has been surpassed on no single undertaking other than the project for the development of atomic energy.

Approximately described, the Continental Shelf is all of the ocean floor around the United States and its Territories that is covered by no more than 600 feet of water. The whole area is almost as large as the area embraced in the Louisiana Purchase, which was 827,000 square miles, and almost twice as large as the original 13 colonies, which was 400,000 square miles. Along the Alaska coastline the shelf extends several hundred miles under the Bering Sea. On the

Eastern coast of the United States the width of the shelf varies from 20 miles to 250 miles, and along the Pacific coast it is from 1 to 50 miles wide.

Two Presidential proclamations assert our sovereignty over the mineral resources of this ground, and our jurisdiction over the fishery resources of the high seas contiguous to our lands. The food and mineral resources of these areas are worth billions of dollars. Experts in the geology of oil lands would not be surprised if we found 22 billion barrels of oil—more than we are sure that we have on the continent—beneath one small part of the shelf that reaches into the Gulf of Mexico. Geologists also think that the shelf will yield rutile, sulphur, ilmenite, chromite, monazite and other heavy minerals. Their expectations are based on geologists' observations and on geologic reasoning. They have "tracked" lines of oil-bearing formations in the earth up to the shoreline, and they have good reasons to believe that the lines continue along the bed of the ocean. They also know which geologic processes create oil, and the shelf has undergone those processes.

The great wealth in this new acquisition is not something that we may take in a few decades or a few centuries. We can begin taking it within a relatively short time. It is true that oil has never been recovered from fields that are distant from the shore and under 600 feet of water, but it has been recovered from a field that is a mile off the Louisiana shore and from another that is 2 miles off the coast of Texas. Techniques for recovering it from deeper waters appear to be possible to our scientists and engineers, and they must appear possible also to at least one oil company, for it has explored the waters of the Gulf of Mexico for oil up to 26 miles off the Louisiana coast.

This Department has been assigned to explore the shelf, and we have developed our plans so far as we can develop them without knowing how much money the Congress will appropriate for the work. We have acquired some of the extraordinary instruments that will be used; we are building or redesigning others. We are formulating a program for cooperative work by geophysicists, geologists, and engineers. Their work will be carried on partly aboard vessels and partly in submarines, and diving bells, and in airplanes. The cost of the survey may run to several millions of dollars if we include the cost of ships and equipment that have served their war purpose for the Navy and which are still in the Navy's possession. Even if we did count the cost of these essentials in the cost of the survey, which would be doubtful bookkeeping, the shelf would still be cheap. Alaska cost us \$7,200,000; the Danish West Indies, \$25,000,000; and the Louisiana Purchase amounted to \$27,000,000. The Continental Shelf cost only the forethought that was required to assert our sovereignty over it.

Regional development is not a new theory of conservation, but

rather an improved technique for developing, using and conserving our resources by the usual means—but doing it better, cheaper, faster, and to better purpose. It is the kind of logical next step in conservation that mass production was in production. We would continue to build dams, power plants, reservoirs, irrigation facilities, and other adjuncts of conservation. We would improve navigation, advance the propagation of fish and wildlife, and create and preserve recreational facilities. We would provide for flood control and for the alleviation of stream pollution, but we would not plan any facility or program singly, nor would we be content to derive from it only those benefits which a single facility or program alone would provide. Instead, we would draw into one plan all of the dams and other facilities that a large region would need to develop and conserve its resources, build each unit, not as a thing in itself, but as a part of the whole, and we would design these unified projects to be operated as a single conservation-and-development program for the benefit of an entire region.

The great facilities which we have recently begun to build, especially those in the Missouri Valley, were designed as parts of a program of that kind. But these facilities and others that will be built later will not work as one unit of their own accord, regardless of how well-designed they may be. They must be operated as a unit, and this Department has helped to prepare for that kind of operation. The Senate Committee on Irrigation and Reclamation was given all of the guidance and information which this Department's extensive experience in conservation enabled us to give, when that committee held hearings on the Murray bill (S. 555). We are prepared to appear before any other congressional committee that may need us.

I approved of the principal aim of the Murray bill, which is to provide by statute that all of the conservation facilities in the Missouri Valley shall be used in coordination. However, I believed that the law should be amended to make possible similar benefits to the inhabitants of other river basins if they wanted them, so I recommended certain revisions in the bill which would assure the continued usefulness of those Federal organizations, within this Department and others, that now successfully administer the established conservation policies of the Nation. My recommendations have been published as a Senate document, and they have been particularized in a bill which this Department has prepared and proposed as a substitute for Senate bill 555, so I will not repeat them here.

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life to propose and advocate such a development. There are few if any differences between my views on the Murray Bill and those of the author.

My principal objection went to the question of administration. Whether the administration should be in the hands of a single administrator or of a board is not so much a matter of principle as it is of practicality. I cannot concur in the disposition that some people have to set up so-called independent boards that can go their own way in criss-cross fashion without any effective control by a principal executive who has the power to see to it that there shall be no waste or overlapping or unnecessary expenditure of money. It is airily suggested that the President, the most overburdened executive in the world, can undertake this additional little chore.

I do not believe that such a burden should be laid upon him. In the end there will be a number of these separate administrations, some of which will overlap as to functions and as to areas to be administered. Unless we are careful these could result in bad administration and worse feeling. As our Government is constituted today, it seems to me that these administrations should clear to the President through the Secretary of the Interior. This Department has had more experience than any other in this type of administration. To clear through the Secretary of the Interior, I do not suggest any lack of proper local autonomy. The history of this Department, especially during the past 12 years, has amply demonstrated our belief in local autonomy to the fullest possible extent consistent with proper coordination and sound administration. Unsupervised and too diffuse local autonomy might mean a series of political grab-bags that would discredit the whole theory of river valley authorities. I do not happen to believe in administration by a debating society and I doubt the efficacy of a shibboleth when it is expected to roll up its sleeves and go to work, day after day, to do a varied and intricate job for the people.

The Congress eventually will decide how these coordinated facilities shall be administered. Meanwhile we are so planning that they can be operated as single developments when a suitable policy has been formulated. Several bureaus and offices are cooperating in these plans so that the preservation of fish and wildlife, the creation of recreational facilities, and the other aims of thoroughgoing conservation will not be overlooked, but the Bureau of Reclamation is planning and building the principal facilities, and is coordinating the program.

The Bureau of Reclamation

This Bureau has presented to the Congress a postwar development inventory of 415 irrigation and multiple-purpose projects in the 17 States that are west of the one-hundredth meridian or are bisected

by it. More than 100 of them are in operation, or have been authorized, or are under construction, and preliminary studies of others have been completed. Among the projects that have been authorized are 29 of those in the Bureau's program for basin-wide development of the Missouri River Valley.

These projects, calling for the construction of dams, irrigation systems, power plants and reservoirs for flood control and other purposes, would create employment for thousands of returning veterans and others, would open new lands to settlement, encourage the development of new business and industry, provide protection against drought and flood, increase Western purchasing power, and would, in many other ways, contribute to the National welfare.

Here, briefly summarized, is what the developments that are proposed by the Bureau of Reclamation would do:

1. Provide almost 200,000 new irrigated farms for settlement by veterans and others. (Construction of proposed projects would bring nearly 11 million acres of new land under irrigation and provide supplemental water to another 11 million acres which now have inadequate water.)

2. Provide jobs at the peak of employment for more than 400,000 workers at construction sites and for thousands of others working in factories, mills, mines, and in transportation throughout the country to supply the necessary materials and equipment.

3. Provide huge blocks of low-cost power for the development of natural resources, of new industry, and of business.

4. Create opportunities for farm workers, tradesmen and professional people in the new and expanded rural and urban communities that would result from such developments.

5. Greatly increase the purchasing power of the West for the products of other sections of the country.

6. Diversify and bring into greater balance the economy of these Western States in caring for an increased population.

Many other benefits would accrue from this program, not only to the persons who would be directly affected by the developments that it provides for, but to the whole Nation as well.

The first of the coordinated programs for regional development—that for the Missouri Basin—was approved by the Congress during the present fiscal year, and the Bureau is now completing studies and reports on 14 other major river basins in the 17 Western States. These studies also embrace tributary basins and many scores of individual projects.

It is from these studies and from 43 years of experience in developing the land and water resources of the West that the postwar program of the Bureau has emerged. The construction of the projects in the inventory will be dependent upon the action of the Congress in

appropriating the necessary funds. Based on 1940 price levels, the estimated cost of constructing all of these projects would be approximately 5 billion dollars, but the major portion of such costs would be returned to the Federal Treasury from payments for irrigation water, proceeds from the sale of power generated at the projects, and otherwise. There would be, in addition, many indirect benefits that could not be evaluated in dollars and cents. The benefits to be derived would return many times over the cost of such a development program.

An understanding of the impact that such a program would have upon the Nation's peacetime economy can be gained from a review of what the projects that are in operation did during the war to help the United States to establish an unparalleled record of production.

Farmers on more than four million acres of land that is irrigated by Bureau facilities produced food, forage and fibre crops valued at more than \$411,000,000 in 1944, setting an all-time record. As the result of the urgency of its war-food program, the Bureau, since 1941, has increased the irrigated acreage served by its projects by 759,000 acres. Of this total increase, 125,000 acres were brought under irrigation during the past fiscal year.

The Bureau's production of electric power has been equally spectacular. At the outbreak of the war we faced a critical shortage of power with which to meet the huge demands of rapidly increasing war production. We actually had a third less power available than the Axis countries had, and that deficiency threatened to retard seriously the production of munitions and equipment that were desperately needed by our armed forces.

How the Nation overcame that power deficiency is one of the stirring chapters in the history of the war. Our production of electric energy was stepped up to unprecedented levels, and the major contributors to that greatly increased output were the hydroelectric plants of the Bureau of Reclamation in the West—the plants at Grand Coulee, Boulder Dam, and elsewhere.

In 1941, Bureau plants had an installed capacity of 828,000 kilowatts. By June 1945, that capacity had been increased to 2,439,300 kilowatts. In speaking of the Bureau of Reclamation it should be borne in mind that the Tennessee Valley Authority, which is a separate agency, is not included. The power output of Bureau plants has quadrupled since the attack on Pearl Harbor. That output this year totaled nearly 14 billion kilowatt-hours, making the Bureau the largest single power-producing agency in the world. The bulk of its output went to war plants—aircraft factories, shipyards, chemical and metallurgical plants, ordnance works, steel, aluminum and magnesium plants, and also to cities, Army airfields and other military installations. It was also used to pump water for irrigation, and to electrify rural homes. From the Grand Coulee-Bonneville system

alone came the power for processing one-third of the Nation's aluminum output for airplane production. Grand Coulee Dam also furnished the huge blocks of power needed for the construction and operation of the Federal government's "mystery war plant" near Hanford, Wash., one of the producers of the atomic bomb.

In these ways the projects of the Bureau of Reclamation contributed to the winning of the war. Now we must help to adjust the Nation to the conditions of peace. Our service men and women are coming back to seek jobs, to look for places to start farming, to practice trades, to establish themselves in business. We must help to keep our great industrial plant at full production, and to maintain the national income at a high level. To accomplish that, and to provide increased opportunities for our people we must apply the lessons learned during the war and bring to full development the natural resources which the Nation still possesses.

The program proposed by the Bureau of Reclamation for developing on a basin-wide scale the great river valleys of the West has that as its objective. Its operating projects have already pointed the way in showing what can be done through coordinated effort and intelligent planning. Similar projects will provide a solid economic foundation on which to build a stronger America, and afford the opportunities for richer, happier living for thousands of people in the years to come.

We cannot end a discussion of the world's largest producer of hydroelectric power without noting that in the harnessing of atomic energy we have a new challenger of the place of electricity. But when we have acknowledged its arrival, that is about all that we can do. We know that atomic energy has been used for the benefit of mankind, although not on a commercial scale. We do not know whether it could be used economically in industry. We presume that it will be used in industry, but we do not know even approximately how long it would take to develop it for such use. In a word, we do not know enough about it to justify an exhaustive discussion of the effect which atomic energy may have upon hydroelectricity.

The Division of Power

With the postwar period on the horizon the activities and responsibilities of the Division of Power have increased commensurate with the many complex problems inherent in the operations and the marketing of power from the largest aggregate of hydroelectric capacity in the world. As of June 30, 1945, the total installed capacity of the plants involved, was 3,107,300 kilowatts with a total generation during this fiscal year of 18 billion kilowatt-hours, more than five times the 3,672,995,000 kilowatt-hours produced by all of the power plants under the jurisdiction of the

Department in 1940. Again these figures do not include the production of TVA, a separate authority.

The Flood Control and the River and Harbor Acts placed additional responsibilities upon the Division. They directed the Secretary of the Interior to dispose of the power that is generated at the dams constructed by the Corps of Engineers. The ultimate installed capacity of these authorized projects will be more than 7,200,000 kilowatts.

In preparing for the transition to a peacetime economy, while meeting the needs of war, studies have been undertaken in order that the power that is under the jurisdiction of this Department may be disposed of in accordance with the policy that the Congress has forged during the past four decades—that is, in such a manner as to encourage the most widespread use at the lowest possible rates to consumers, consistent with sound business principles, and with a preference to public bodies and cooperatives. Consideration is also being given to the problem of the integration, with our Federal power projects, of fuel-operated generating plants that were built to serve some of our large military establishments and war plants.

The Division has reviewed or has participated in the determination of the allocation of costs of dams such as Grand Coulee, in the establishment of rate schedules, and in the negotiation of various contracts for the sale of power by the Bonneville Power Administration, the Bureau of Reclamation, and the Southwestern Power Administration. It assisted the Solicitor's Office in the negotiations for the disposal of the Hetch Hetchy power by the city of San Francisco in accordance with the terms of the Raker Act. It cooperated in the studies and negotiations of the Bureau of Reclamation for the proposed acquisition of the power facilities of the Salt River Water Users' Association in Arizona and of the Minidoka and Burley power facilities in Idaho in an effort to bring about unified operating systems and to make possible lower rates. It also assisted the Puerto Rico Water Resources Authority and the territorial government of the Virgin Islands in connection with their power problem.

The Bonneville Power Administration

America's best insurance against the threat of possible economic chaos is its supply of human and natural resources, and the ability to convert both into national wealth under a system of free enterprise. The Pacific Northwest, with its inexhaustible supply of hydroelectric power and its still untapped reserves of some natural resources, will be expected to contribute much toward a balanced economy. In view of this, and recognizing also that difficulties would be caused by cut-backs in war industries, by reconversion, and by the dislocation of industries after the war, the Bonneville Power Administration, early

in the fiscal year 1945, set out to make a realistic appraisal of the job ahead.

A brief analysis of the Administration's war loads indicates that possibly as much as 600,000 kilowatts, or approximately half of the Administration's total production, may become available for re-marketing. In order that this power may be marketed as quickly as possible and to prevent, insofar as is possible, any loss of the Pacific Northwest's wartime industrial gains, the Administration is devoting considerable effort to an extensive program of market and system development. The marketing program is directed toward the development of new power outlets for industries that will directly or indirectly provide jobs for returning service men and displaced war workers.

Cooperative research programs have been established with major educational institutions in Oregon, Washington, Montana, and Idaho to study and develop the potentialities of farm electrification, of electric home heating, or electric generation of processed steam and of other projects that, if developed, would require electricity.

Bonneville's own research staff is gathering data on railroad electrification, on the application of power in the development of the plastic industry in the region, on electric space heating, on urban and rural power utilization and on other potential uses for Columbia River power.

A program of system development, which was formulated by the Branch of Engineering and Operations, contemplates the early investment of approximately \$164,000,000 in new transmission facilities designed to bring low-cost power from existing and proposed Columbia Basin projects to farms, homes and industry throughout the region. The new facilities will enable the Bonneville Power Administration to bring power into power-deficient areas, and will make Columbia River power available to any point in the Northwest at the Bonneville standard wholesale rate of \$17.50 per kilowatt-year.

This postwar construction program will provide approximately 46 million man-hours of work at the construction sites and a great number of jobs in the manufacture and transportation of the equipment and materials that would be required.

Initially, the function of the Bonneville Power Administration is regional development; its final objectives are social and economic progress. The mechanism by which these ends are to be achieved is the marketing of an inexhaustible natural resource—Columbia River hydroelectric power. Unlike many Federal development agencies whose programs, in varying degrees, have been arrested in the course of the war, the activities of the Bonneville Power Administration have shown marked acceleration, to a large extent due to war necessity.

During the fiscal year 1945, Congress passed the omnibus rivers and harbors bill which authorized the construction of four dams on the Snake River in Idaho and the McNary Dam on the Columbia near Umatilla, Oreg. The Flood Control Act was passed, authorizing appropriations for the development of the Willamette Basin project, including the Detroit, Lookout Point, and Quartz Creek Dams. In both bills Congress authorized the Secretary of the Interior to market surplus electric energy from the proposed projects.

With these projects authorized for early postwar construction, the Bonneville Power Administration began to develop an extensive program of construction and of market development to encourage the utilization of the Pacific Northwest's water resources for the benefit of the region.

Operations during the fiscal year have been eminently successful. In addition to having made a contribution of incalculable value toward winning the war through service to war industries, military establishments and agriculture, the Administration has progressed in its construction and power marketing programs. The financial position of the project is sound and may be expected to remain so despite temporary setbacks that were caused by the changeover from full wartime to partial peacetime activities.

The transmission system that is serving all of the major load centers, particularly those which have been engaged in war goods manufacture, and also much of the outlying region, will be ready for further expansion according to already completed plans as rapidly as manpower and materials become available.

The Southwestern Power Administration

During the past fiscal year the Southwestern Power Administration continued to operate the Grand River Dam project, marketing the power that was generated there, and at the Norfolk and Denison Dam projects, which are operated by the War Department.

The Grand River Dam project, which is owned by the Grand River Dam authority, an agency of the State of Oklahoma, was under Federal control for the duration of the war. The Government completed the transmission system and made contracts to dispose of the power output to war industries, chief among which are Camp Gruber, an Army camp near Muskogee, Okla.; Oklahoma Ordnance Works, near Prior, Okla.; The Cardox Corporation at Claremore, Okla., and the Jones Mills Aluminum Reduction Plant at Lake Catherine, Ark. During the past 2 years, the Southwestern Power Administration has worked to secure desirable industrial loads for the project, which would continue after the war. As a result of this work, service was begun to The B. F. Goodrich Co. plant at Miami, Okla., in December 1944, under a permanent contract.

The Norfolk and Denison Dam projects are each equipped with one 35,000-kilowatt generating unit. They have no transmission systems. It was, therefore, impossible to sell the electric production of these two projects directly to wholesale users. Contracts were negotiated with the neighboring private companies, under which the companies purchased all of the power output for their own use. The private companies in return, have made substantial rate reductions to Government-owned facilities and to other consumers, by specific provision of the contracts. These two projects have been in full commercial operation since March 1945.

The Administrator of the Southwestern Power Administration has made and published a general study covering all of the constructed, authorized and proposed War Department dams in the Southwest. We intend to initiate the program of development during the next fiscal year.

Bureau of Mines

The continuation of the many varied scientific and technologic activities of the Bureau of Mines provided assistance to the producers and manufacturers of war materials and to the armed forces, and also resulted in the addition of a wealth of technical information which is expected to benefit the Nation in the readjustments of the post-war years. These services to industry and to the Nation obviously are worth many times what it cost the Bureau to render them.

Many of the advances made in the laboratories and pilot plants that are operated by the Bureau were achieved under the pressure of a national emergency, but they will help the mineral industries to adjust themselves to a new peacetime economy. This is especially true in the field of mineral exploration and development; that is, in the search for critical and essential ores and in experiments to find the best and quickest methods of converting these ores into usable metals and other mineral commodities. During the war years, the Bureau performed a great deal of this kind of work, because of the need for speedy action to meet changing requirements.

Equally important technological results were obtained in many other widely diversified fields in these years, including research in coal and coal products, explosives, ventilation, petroleum, synthetic fuels from coal and oil shale, air and dust analyses, and fuel efficiency. The Bureau's specialists strove to answer questions that would solve urgent wartime problems, and they answered many of them.

Not all of the Bureau's experiments were successful, but that is not expected in any kind of scientific research, and enough of them yielded results to cause other war agencies to depend more and more on the Bureau in certain fields. Many of the techniques and processes that were developed by the Bureau during the war already have been

adapted by private industry and in Government-operated plants, and others are being considered in long-range post-war planning.

The Bureau's staff also provided valuable aid in consultation with Government and industry in fuel efficiency, in the conservation of manpower through safety training and accident prevention, and in promoting a more efficient utilization of all resources. Furthermore, the factual information that was supplied by the Bureau about the production, distribution, and consumption of scores of mineral commodities was important to the war planning of many agencies and is essential in peacetime to industry. Most of the technical information accumulated by the Bureau in 1939-45 has been compiled and published.

Without waiting until the end of the war, the Bureau of Mines began to plan for the postwar era, with the hope that the Bureau and the Department might be helpful in formulating a future mineral policy for the Nation. I have already discussed our depleted mineral resources, and I have recommended some remedial measures. I here recommend further that we do all that can be done to insure the health and safety of workers in mines and smelters and plants, both to conserve manpower and to make additional reserves available by the removing of hazards. The Bureau of Mines has had more than three decades of experience in this field, and gave the advantage of this to Government and industry during the war. Accident rates declined and the production of coal mounted despite manpower shortages, loss of skilled workers to the armed forces, and the inability to replace worn machinery. Innumerable safety improvements were made as the result of the Bureau's inspection of 3,400 coal mines last year. Thousands were trained in first aid, mine rescue, and accident prevention, and Bureau engineers saved lives by assisting at major mine fires and explosions.

Without a detailed knowledge of the economic conditions in the minerals industries, no program of exploration and investigations could be expected to succeed. I think that the Bureau of Mines should be authorized to expand its economic and statistical services to obtain accurate and up-to-date information on the production, distribution, and consumption of all of our minerals and fuels.

The mineral legislation under which the Bureau of Mines operates now, with one or two exceptions, is permissive in nature. The Bureau in general is an advisory agency, and is in no position to exercise any authority over the use of mineral resources. New legislation designed to cope with postwar problems should be more positive, requiring specific things to be done, and having the effect of defining a national mineral policy. A good example of the type of legislation needed is the Synthetic Liquid Fuels Act, which sets forth a specific 5-year program of research in the production of gasoline and oil from coal and oil

shales, defines clearly what should be accomplished, and appropriates funds for the purpose. Another is the Federal Coal Mine Inspection Act, authorizing the inspection of coal mines in the interest of safety and efficiency.

With its pilot plants and laboratories, its engineers, chemists, metallurgists, geophysicists, and other trained personnel, the Bureau of Mines is ready to put into effect a Nation-wide program of mineral conservation and development which it believes will be in the interest of future security and national welfare. Many of its recommendations have been submitted to Congress, others are in advanced stages of development.

The Geological Survey

Geology is becoming increasingly important to the Nation's social and economic welfare. During the war our geologists located new mineral deposits by applying geologic principles. They also predicted for the military intelligence the terrain conditions in those areas in which combat operations had to be conducted. While their military activity was perhaps the more spectacular and won numerous military commendations for directly assisting the armed forces, the Survey's information about our mineral deposits, and its program of searching for new ones, contributed materially to solving the country's supply problem.

Turning from the past to the future, the Survey recommends a considerably extended program of aerial geological mapping so as to provide the necessary geological basis for sound planning in the development of our resources. The Survey also recommends continuation and extension of the scientific investigations that, during the war, were conducted cooperatively with geologists representing our allies. These international projects not only bring mutual scientific benefits but they can become a strong contributing force towards better international understanding.

During the year the Alaskan Branch continued its investigations of mineral deposits in Alaska, performed geologic services for the War and Navy Departments, and compiled aeronautical pilotage maps and charts for the Army Air Forces. The investigation of mineral deposits contributed to a more adequate inventory of Alaska's mineral resources, particularly in regard to deposits of mineral materials other than the precious metals. The Branch's geologic service to the armed forces was principally in regard to phenomena associated with permanently frozen ground. An understanding of these phenomena is necessary for carrying on construction activities in frozen-ground areas. The compiling of aeronautical pilotage maps was a continuation of the high-priority mapping from aerial photographs that has been carried on for several years by the Alaskan Branch for the Army Air Forces.

The limitations of funds and personnel prevented the undertaking of any activities aimed toward satisfying the many anticipated needs for information regarding Alaska. Plans for fulfilling Geological Survey responsibilities in Alaska have been made, however, and will be put into effect so far as funds and personnel permit as postwar needs become more acute.

In the Annual Report of the Secretary of the Interior for the fiscal year ending June 30, 1938, the percentage of the area of the United States covered by topographic maps was given as 45 after deductions had been made for maps that had become obsolete and inadequate. As the latest report gives the percentage as 47.7, the average annual increment over the 7-year period is approximately 0.4 percent and for the 65-year period of the Survey's activity the average annual increment is 0.74 percent. At these rates from 70 to 130 years may be required to map this country completely. At this critical period in our history when a serious, thoughtful effort should be made to appraise our national economy and plan for the future, the lack of this essential part of the basic knowledge required for intelligent planning is a serious handicap that we should strive to overcome.

The investigations of the quantity and chemical quality of the Nation's water resources have been continued. These investigations, which relate to a varying and recurring resource, yield records that are widely used by administrative officials in planning water projects, in dividing water among users, and in determining and administering water rights. The records are also used by engineers in the design and operation of hydraulic works and other structures affected by water; by financiers in the consideration of investments; and by lawyers and courts in the adjudication of rights and the assessment of benefits and damages. During the war the information has been conspicuously valuable in the placement, design, and operation of military and naval establishments of many kinds, including power and industrial plants, munitions plants, cantonments, airfields, and hospitals, and in developing water supplies for new concentrations of population brought about by war activities. It will be no less useful in the postwar period of adjustment and reconversion to the requirements of the Nation at peace. As the limits of supply are approached, more and better water is always being sought, and investigations of its availability and utility must be continued.

Although hampered by manpower deficiencies in critical positions, in both field and headquarters staffs, the Conservation Branch has maintained a high level of accomplishment in classifying the public-domain lands as to their mineral and water-power potentialities, in supervising the development and production of minerals from leased lands under Departmental supervision, and in rendering consultative

assistance to various Government agencies and to individuals concerned with public-land administration and minerals development.

The land-classification activities required the expeditious handling of more than 13,000 cases, each involving many geologic investigations and determinations by the field and headquarters staffs; the administrative definition of the known geologic structure of seven producing oil or gas fields; the geologic appraisal of 80 unit plans of operation; and numerous special reports to the General Land Office, mostly in aid of a program for the discovery of new oil and gas fields or deposits during the national emergency.

Mineral-lease supervision, involving the work of special study groups, and the regulation of the development and production of coal, oil, gas, sodium, potash, lead, zinc, and many other minerals from public, Indian, and Naval-petroleum-reserve lands, were continued with due regard to those approved conservation principles which have long guided the Survey in its minerals-recovery policy. Known reserves of such minerals on leased lands under supervision are estimated to have a value in place in excess of 2 billion dollars. Production from these reserves amounts to \$150,000,000 annually and is rendering royalty returns in benefit of the public interest amounting to \$12,000,000.

The Solid Fuels Administration for War

Despite numerous difficult wartime obstacles, the coal mining industry has supplied the unprecedented quantities of fuel required by war production plants to equip the armed forces. This the coal-industry accomplished with the smallest labor supply in a half century.

The civilian population, although at times inconvenienced by winter emergencies and frequently having been obliged to burn substitutes, has had sufficient solid fuels to keep healthfully warm, if not always comfortable. The Nation also has had enough fuel to maintain its wartime civilian economy at an extraordinarily high level.

This is an achievement of which the industry, the government and the consumer can be proud, considering the difficulties involved. We solved, by democratic processes, the perplexing problems which our enemies would have sought to solve by despotic procedures. It was the result of careful planning and control by the Solid Fuels Administration for War, of hard work and good management by the miners and operators, and of cooperation by all parties concerned.

During the war the American miners' average output rose to the highest level of all time; higher than that of any other nation. They worked longer hours than the free miners of any industrialized country in the world.

Difficulties encountered in the production of solid fuels lay, primarily,

in the steady loss of mine manpower to the armed services and to other wartime industries. In many instances mine workers were attracted by higher pay and safer, less arduous employment. We cannot, however, overlook the fact that recurrent disputes between labor and management, which plague this industry in peace and war, prevented the production of additional coal. We were able to hasten the restoration of mine output, thus avoiding major impairment of war production, by helping to speed the settlement of disputes and by taking possession of the mines on various occasions.

While we did not lack fuel from underground which was needed to wage this war, the heavy wartime drain accelerated the depletion of reserves of high grade metallurgical coals and other special purpose coals, and brought closer the time when it will be necessary to deal with the problem of their exhaustion.

The most critical period with respect to our supply of solid fuels occurred in the fiscal year just passed. Bituminous-coal requirements soared to an unprecedented 626,000,000 tons during the fuel year which ended on March 31, 1945. Yet the lack of mine manpower and all-too-frequent strikes caused production to fall some 16,000,000 tons under that figure. Furthermore, we were approximately 5,000,000 tons short of the 66,100,000 tons of anthracite necessary to meet our needs.

Since these deficits in bituminous coal were of particular kinds that were essential to the manufacture of steel, chemicals, and other vital war goods, and upon which a large part of the Nation depended for heating fuel, they presented problems of unusual complexity. It was only by exercising the most careful control of distribution of mine output, by requiring industries to use coal out of stockpiles built up to record heights earlier in the war, and by the insistence upon fuel conservation and the acceptance of alternative fuels by industries and householders, that those problems were solved.

The high degree of success with which distribution difficulties were overcome was due, in great part, to the cooperation of producers, wholesalers, dock operators, and retail dealers in carrying out, without recourse to coupon rationing with all of its undesirable aspects, measures for maintaining an equitable sharing of the available solid fuels supply.

Early in the war, the need for careful planning and control of distribution was recognized. Requirements were forecast a year ahead, production was estimated in advance, and basic distribution patterns were established. Industry representatives were consulted extensively in the formulation of programs. Normal distribution channels were disturbed as little as possible. Controls and regulations were kept at a minimum, giving industry the widest possible latitude for exercising judgment. Under such a policy, producers and con-

sumers alike were enabled to act intelligently. Probable difficulties were detected in sufficient time to permit appropriate counter measures to be taken as they arose.

We did everything within our power to help the coal-producing industry to increase its output. This included aid in obtaining the deferment of as many essential workers as possible from military induction and in providing mine operators with machinery, equipment and supplies. We made a vigorous, if unsuccessful, effort to obtain the release of experienced mine workers from military service after the fighting in Europe was ended. I regret that, because of the lack of funds, we were unable to carry on as effective a fuel-conservation program as conditions seemed to require.

It now appears that the job of maintaining an adequate fuel supply during the winter of 1945-46 would require that the Solid Fuels Administration for War retain the right to direct the distribution of solid fuels, and to stimulate the use of alternative fuels wherever the scarce types are not available.

Disruptions in the flow of coal, due to bad weather, strikes, or other causes, may require emergency action from time to time. We face a most difficult task in preparing for such emergencies while at the same time shipping coal to Europe to help prevent chaos and anarchy from sweeping the liberated nations because of the lack of fuel.

The General Land Office

The public land is an asset which must be taken into account in any evaluation of the natural resources of the United States. This 778-million acre domain belonging to the people is conservatively estimated as representing nearly a quarter-billion dollars' worth of real estate which is under the administration of the General Land Office. While it is obvious that no man can compute with unalterable accuracy the permanent value of land, it is believed that this vast expanse of public domain in the United States and Alaska comprises real estate values aggregating \$235,000,000 of which \$125,000,000 are located in the United States itself. Roughly divided, the assets comprise forest lands and woodlands worth \$160,000,000, grazing lands (outside of districts administered under the Taylor Grazing Act) whose value is placed at \$30,000,000, and other lands, including barren areas as well as those devoted to special uses, valued at \$45,000,000. In addition to this conservative evaluation of the land, technical services rendered to the public and to agencies of both Federal and state governments by the General Land Office constitute other less tangible factors whose values are estimated to bring the total worth of the people's assets in this real estate to \$250,000,000.

The continued management of this property under progressive

conservation policies for use and development with an eye to the requirements of the future, is essential, since in no other way can the domestic demands for maximum beneficial use of the land and its resources adequately be met in the reconversion period.

Already, the trend of scientific research has pointed the way to new fields of usefulness for the public domain, broadening the scope of activities in the development of resources beneath the surface and increasing the opportunities for utilization of the land itself. The wider horizons for mineral uses revealed by the discovery and development of atomic energy, the steadily mounting requirements for lumber and other forest products to repair the ravages of war, and the growing demands for ex-servicemen for land settlement opportunities, serve to illustrate the trend toward more extensive usage in the year immediately ahead.

Obviously, this contribution to future economic advancement will enhance the value to the American people of their public domain. However, it will also bring a corresponding increase in the responsibilities facing the General Land Office. New methods and new laws must be provided with which to carry out these new tasks which, in effect, mark the beginning of a new era in national land administration.

Land administration experiences in connection with the prosecution of the war have sharply accentuated the pattern for efficient management of the public domain in time of peace. At the close of the 1945 fiscal year, definite alterations in Federal law and in procedures of the General Land Office were revealed as imperatively needed to bring about the type of management to which the public is entitled and without which the maximum beneficial use of the national lands and their resources, cannot be assured. Some of these needs long have been recognized, but their enactment was held in abeyance for the duration of the war: Today, freed from the restrictions of military necessity, problems awaiting solution include the rejuvenation of our Federal mining laws and the enactment of a general mineral leasing statute. A thoroughgoing examination of the remaining vacant public land to determine its availability for homesteading use also should be undertaken to meet to some extent the needs of returned veterans for land settlement opportunities in the United States and Alaska. Other factors equally essential to the successful administration of a well-rounded and integrated national land use program are set forth in the detailed report of the General Land Office.

Meantime, it is noteworthy that this official real estate agent of Federal Government closed its books for the 1945 fiscal year with a net profit both in conservation advancement and in financial gains resulting from its work. Operating through four branches with 12 divisions in Washington, 5 agencies in the field with 25 offices scat-

tered throughout the West and in Alaska, and 25 district land offices also strategically located for service in the West and in the Territory, the activities of the General Land Office produce cash returns several times greater than the expenditure incident to its maintenance. In 1945, these cash receipts totalled \$13,381,654 and represented a ratio of \$5.66 for every \$1 of the expenditures, which aggregated \$2,365,005. This was the second consecutive year in which the receipts exceeded \$13,000,000, and the fourth time that receipts of the General Land Office have exceeded \$10,000,000 since 1880.

Aside from these financial accomplishments, definite progress was made during the year in the conservation of natural resources on the public lands. Foremost among its obligations in this field is the establishment of sustained-yield forest management on all of the Federal lands under its jurisdiction, as required by congressional mandate enacted during the 1945 fiscal year. Under this program, forestry operations on the timbered public domain eventually will be brought into a balanced ratio in which the volume of tree-cutting and tree-growing will be regulated so as to provide a continuing supply of timber.

Definite contributions to the Nation's lumber needs were made during the year from the 2½ million acres of revested Oregon and California railroad grant lands in western Oregon under the administration of the General Land Office, operating through its Oregon and California Revested Lands Administration in Portland, Ore. In 1945, sales of timber from these lands exceeded 426,000,000 board feet valued at approximately \$1,518,000. Meanwhile, definite plans for cooperation with private management in the maintenance of sustained-yield forest practices on intermingled public and privately owned lands were advanced during the year.

Prospects of postwar development of Alaska which will increase the burdens of the Alaskan Fire Control Service in the prevention and suppression of fires on more than 250,000,000 acres of public domain in the Territory, confronted this branch of the General Land Office at the end of the 1945 fiscal year. The end of the war is expected to bring about an unprecedented number of tourists and settlers, the reopening of mining operations, and the construction of new airfields and roads, all of which will present new and greater fire hazards.

Favorable weather conditions in 1945 resulted in the smallest fire loss in the 6-year history of the organization. During the year the service took action on 57 fires with a total burned area of 2,535 acres, of which 624 acres were on private land. There were 13 fires inaccessible to the Service which burned over an estimated 110,200 acres. The number of fires for the year, therefore, totaled 70 with an aggregate loss of 112,735 acres. Service records show that more fires were caused by lightning in 1945 than in former years, about 37

percent of the total number of fires being started by lightning, and approximately 98 percent of the total acreage consumed being due to lightning fires.

In the 1945 fiscal year, the use of more than 12,400,000 acres of public land in the United States and Alaska for the grazing of livestock was supervised by the General Land Office as part of its administration of the people's real-estate assets. Consisting of tracts in Alaska that are suitable for grazing purposes and of similar areas in the United States that are not included in the established Federal grazing districts, a total of 12,479,270 acres was made subject to use under 10,593 leases involving annual rental of \$229,523.

The Office of Land Utilization

Experience in the Department of the Interior during the past several years has clearly demonstrated the value of effective coordination and close cooperation in the field of land and resource management. The Office of Land Utilization, which is charged with the responsibility of coordinating and integrating the land-use and land-management activities of the several bureaus and agencies of the Department, continued its policy of promoting unified action through cooperative efforts, the dissemination of information, and the rendering of efficient advisory service.

The methods pursued have proved to be successful and have operated definitely in the public interest. It seems clear that the time has arrived when the principles of coordination and cooperation should be extended to all agencies that operate in the conservation field. The effective use and development of the basic wealth of the Nation—its soils and waters, its forest and pasture lands—will not be at its best until all interests involved have fully coordinated their responsibilities and activities.

The Grazing Service

On the whole the surface resources of the Federal range in grazing districts are in as good condition as they were in at the beginning of the war, or in better condition. Even so, the range made an effective contribution to the Nation's needs for war. This is in sharp contrast to the situation of the First World War when increased numbers of livestock on the open public domain, then unregulated, stripped the forage and hastened its depletion without adding materially to food supplies during that conflict. The range livestock industry itself, aided by stabilized range use fostered by the Taylor Grazing Act, is now in a strong position to cope with the problems of postwar readjustment.

The use of 14½ million acres of Federal range as testing grounds for machines and training grounds for men emphasized the importance of

these lands as a key to successful global warfare. While it was necessary to exclude livestock from certain military training areas and testing areas such as the one used in the atomic bomb experiment in New Mexico, it was possible through special arrangements with the military authorities to provide alternate grazing during the war period for nearly 500,000 sheep and 16,000 cattle on areas set aside for war purposes.

Livestock production levels of the earlier war period were maintained and in some localities exceeded during the year ending June 30, 1945, although slightly fewer animals were permitted on the range than in the previous year. Total numbers licensed to use the range declined 6 percent from 10,694,305 to 10,019,178, a reduction of 675,127 head. There were 725,464 fewer sheep but 86,174 more cattle. The number of authorized users decreased by 912 from 22,562 to 21,650. Big game increased from 535,000 head to 583,000.

On the basis of natural wealth and long-time economic values, the surface resources and facilities of the Federal Range, administered by the Grazing Service, have an assumed capital value of not less than one-half billion dollars. Although the principal use made of range land is the grazing of livestock and the providing of food and shelter for big game, these purposes are closely related to those of other resources among which are the soil, water, wood, and crop lands, and recreational areas. The administration of these land aims, in addition to stabilizing the dependent livestock industry, to accomplish the conservation and proper use of all of the resources upon them. Progress toward these objectives by the Grazing Service, although interrupted by high priority war needs, was in general satisfactory during the fiscal year just closed.

The Fish and Wildlife Service

If all of the economic and game animal resources were to vanish from this continent tomorrow, the United States could reckon this catastrophic loss at something over a hundred and forty billion dollars. This is the value which the Fish and Wildlife Service places on the birds, mammals, and fishes which inhabit the Nation. The abundance of these resources is in a state of continual change. Against the many forces acting to reduce it—such as excessive exploitation, pollution, diversion of water for industrial uses, etc., the Fish and Wildlife Service is acting in various ways to increase it. This service to the Nation is evaluated as being worth approximately 30 million dollars a year.

The war has had little, if any, effect upon the abundance of our continental fish and wildlife resources. If anything, it was beneficial to it, since hunting and fishing were generally below peacetime levels.

However, certain of the commercial fisheries increased the intensity of their operations in response to augmented demands for protein food, and imposed added strains on the stocks of those species which they exploit. Hence the problems of restoring stocks that have declined in quantity will be one of the most important post-war activities of the Fish and Wildlife Service.

From the standpoint of conserving fish and wildlife, a problem of primary importance has been created by the increasing uses of water for public purposes. However, the disposal of sewage and industrial waste products, is an obnoxious nuisance. As a result of the researches of Fish and Wildlife scientists, pollution is becoming less excusable each year. This is because the Service is constantly improving and enlarging the criteria of acceptable water quality, and is constantly striving to develop methods of utilizing waste. Largely as a result of these efforts, domestic sewage and almost every kind of industrial waste can now be disposed of by practical and commercially profitable means. Thus, conservationists have an unassailable position in answering any assertion that it is too costly or impractical to avoid defiling our streams. Indeed, many industrial enterprises in the fields of distillation, brewing, canning, petroleum refining and electroplating have not only been able to eliminate waste, but to do so at profits greater than those derived from some of their basic products. Thus it looks more hopeful than ever that pollution will gradually become a less menacing evil as our fight against it progresses.

Meanwhile the accelerating trend to modify water courses for power, irrigation, and flood-control projects, is a serious threat to the resident animal life. A dam can change a stream enough to exterminate the most valuable fish and wildlife resources dependent on it. Yet it is possible to devise means of modifying that dam so as to preserve those resources. That is what the Fish and Wildlife Service is endeavoring to do wherever major water utilization projects are under construction or are being planned. There are few if any precedents or principles to guide in this work. For the most part each dam presents an entirely new set of conservation problems which must be solved before construction, and tested afterwards with results that may not become evident for several years. During 1944, an experiment designed to preserve the salmon of the Columbia River, which were stopped in their upstream migration by the unsurmountable Grand Coulee Dam, was tried for the first time. This involved trapping the fish and hauling them overland by truck to the tributaries below the dam. The remarkably successful results give hope that the problems of preserving the animal stocks in the numerous other places where dams are projected, will be as successfully solved through the intensive study that the Fish and Wildlife Service is carrying on.

The encroachments of civilization upon primeval habitats has emphasized the importance of refuge areas as the most effective device for conserving wildlife. During 1944, six large areas were added to the national system, which now furnishes protection to about 25 percent of the waterfowl resources.

The Office of the Coordinator of Fisheries

The year 1945 brought the completion of the principal task which had been assigned to the Office of the Coordinator of Fisheries upon its creation early in the war. This was to restore and maintain the ability of the fishing industry to produce the protein foods, vitamin oils, animal feeds, and industrial oils which were needed in exceptional quantities for war purposes. The productive capacity of the industry has been shattered by the events of the first months of war. The requisitioning of boats, the drafting of skilled fisherman, the heavy needs of the military services for netting, cordage, marine engines, and most of the other essentials of fishery production, all made the problem of meeting the heavy war demand for fishery products an especially difficult one.

From its normal level of about 4.4 billion pounds, the yield of aquatic products declined in 1942 by half a billion pounds. Beginning in 1943, however, production made steady and gratifying increases, actually exceeding the peacetime yield in 1944 and continuing to gain in 1945.

This steadily increasing production was achieved principally by restoring the numerical strength and effective functioning of the fishing fleet. Specifically, it was brought about by the construction of new fishing craft, the provision of facilities for repair, and the supplying of nets, cordage, and other equipment that was necessary to production.

During the period from May 13, 1943, to June 30, 1945 the Coordinator's Office authorized the construction of 2,002 new fishing vessels and recommended the approval by the War Production Board of applications for controlled materials and products worth \$9,053,605. In addition to acting as claimant for the fishing industry before other Government agencies, the Coordinator's Office administered production programs controlling fisheries which collectively yield about one-third of the total United States production—those for the Pacific sardine or pilchard and for the salmon of Alaska and Puget Sound. Under these programs, the available manpower and equipment were used far more effectively than would have been possible otherwise, and the yield of these important fisheries was maintained at a satisfactory level in relation to the stocks of fish.

In carrying out its wartime task of supplying the aquatic products that were needed for war, the Coordinator's Office has also worked

to safeguard the fishery resources from excessive drains which would impair their future value to the Nation. In contrast to the situation at the end of World War I, the fisheries as a whole have been maintained in sound condition.

The National Park Service

The National Park Service, although operating throughout the war with greatly reduced personnel in the field and at its headquarters, experienced a steady increase in travel to the 169 areas that it administers. This increase became more rapid with the end of the war in Europe; next it became a flood. Not only did this suddenly increased use of the National Park System place a heavy strain on the organization of the National Park Service and of the companies operating concessions; it also forecast a volume of travel during the next season which may well surpass the record year of 1941.

This prospect points to the necessity of bringing the Service's organization back to approximately its prewar size and functions. This will be impossible without funds to supplement those now available, since the present appropriation was determined in the expectation that the war with Japan would continue for another year at least, and that the wartime low volume of travel would continue.

The National Park System has been weathering the war period without material damage to the resources of scenery and history and science which it is charged with conserving. Perhaps the most serious threats to such resources were found in the efforts to open parts of Olympic National Park to the logging of Sitka spruce and of Great Smoky Mountains National Park to the cutting of its virgin stand of red spruce. Proposed legislation, which would have compelled the opening of all national parks to the grazing of domestic livestock, aroused such widespread opposition that no action was taken on it in the Seventy-eighth Congress, neither was it introduced in the Seventy-ninth.

Although the work of the National Park Service was not considered to be tied in directly with the prosecution of the war, the areas that it administers provided much-sought recreational opportunities for members of the armed forces and those engaged in war industry, and it is also fair to say that the system through war permits made its appropriate contribution to the victory.

Immediately ahead of the National Park Service, as soon as funds can be made available for it, is a program of reconditioning of roads and trails and of the utilities and facilities that are used for administration and for direct service to the public. For this it is estimated that \$1,200,000 will be required during the next year or two. Along with that should go an orderly program of needed developments.

All construction has been halted for 4 years. A program should be started for the acquisition of non-Federal lands within the boundaries of areas in the park system. These holdings, amounting to more than 600,000 acres, make it difficult to furnish adequate protection to Federal properties, add to the expense of providing needed developments, and are open to undesirable and destructive uses.

The controversy over the establishment of Jackson Hole National Monument was marked by two important events: The late President Roosevelt's veto of the Barrett bill, which would have abolished the monument, and District Judge Kennedy's decision, in the Case of the *State of Wyoming v. Paul Franke*, affirming the legality of the President's action in establishing the monument. Representative Barrett has reintroduced his bill and Senator Robertson has introduced a bill to amend the Antiquities Act of 1906 by providing that the establishment of a national monument would require approval by the Governors and a majority of the congressional delegations of the states affected. No action has yet been taken on either of these nor on any of the four other bills now pending which would amend or abolish the Antiquities Act. I continue to believe that it is still true that only vision and perspective can be relied upon to save for Americans of future generations outstanding areas that belong to the whole people.

The cooperative responsibilities of the National Park Service have been appreciably enlarged through the first appropriation to implement the Park, Parkway, and Recreational Area Study Act of 1936; by studies, undertaken at the request of the Corps of Engineers, of the recreational values of reservoirs proposed to be built by them; and by a study, launched at the request of the Bureau of Reclamation, of the same sort with respect to their prospective reservoirs in the Missouri Basin. By agreement with the Bureau of Reclamation, the Service is also undertaking the administration of the recreational resources of the Friant and Shasta Dams in the Central Valley project in California.

The Office of Indian Affairs

The Office of Indian Affairs reports some important gains during the past fiscal year.

The program of land acquisition and consolidation has been continued; 257,000 acres, formerly opened for settlement but unclaimed, were restored to Indian use. Tribal funds, totaling \$177,000, were used in purchasing 63,000 acres on 12 reservations, much of this land being from Indian estates complicated by heirship. The Jicarilla Apaches newly completed their program of consolidation, and the Southern Utes reacquired 40,000 acres at a cost of \$83,000. The

Rosebud and Cheyenne River reservations have made notable progress in the exchange of heirship interests for use-rights in tribal lands, thus enabling many Indians to engage in, or enlarge, farming and livestock operations.

Recent experience has demonstrated the facility with which the resources on Indian lands could be developed for the national benefit. Thus far during the war, 11,400 oil wells on Indian lands produced more than 70,000,000 barrels of oil, principally in Oklahoma, Montana, and Wyoming. During the past fiscal year Indian wells yielded 23,000,000 barrels of oil. The excess draft on this nonrenewable resource, however, was not too heavy, and conservation practices continued to be applied in the Osage field. The yield of the Cutbank field on the Blackfeet Reservation began to decline in 1945.

War bonuses made possible the extraction of some low-grade lead and zinc ores from the Quapaw lands, which yielded 78,248 tons of zinc and lead concentrates during the past year. The total production during the war years was 415,000 tons valued at \$38,000,000.

More than half a billion feet of timber were cut and removed from Indian forests, the major portion being for military use. Indian saw-mill enterprises produced more than 30,000,000 feet of lumber, but the principle of sustained yield was maintained.

Maximum production was maintained on 44,000,000 acres of forest and open range land, and overstocking generally was not permitted, although overgrazing still presents a difficult problem on the Navajo, Hopi, and Papago reservations.

In the calendar year 1944, the Indians earned a total income of more than \$15,000,000 from their beef and dairy herds—an increase of more than \$1,000,000 over the previous year. In addition, the livestock and livestock products consumed at home had a market value of more than \$7,000,000.

Although about 45,000 Indians left their homes during the year to work in various industries, while 25,000 others were serving in the armed forces, those who remained at home produced nearly 5,000,000 bushels of cereal crops valued at \$5,000,000. Other field crops with a market value of \$3,500,000 were produced, while tree fruits, nuts, and berries, sold and consumed, were worth \$775,000. Garden produce, raised by 32,000 families, was valued at more than \$1,000,000.

Indians not only increased food production at home, but further contributed to victory by working for the Red Cross and by assisting in the war-loan drives. Many communities, in which income are small in terms of cash, made large contributions to the Red Cross, and war-bond quotas were frequently over-subscribed.

Indians in the armed services won high praise for their conspicuous gallantry on all fronts. The Office of Indian Affairs has recorded two awards of the Congressional Medal of Honor, 51 of the Silver Star,

70 of the Air Medal, 34 of the Distinguished Flying Cross, and 50 of the Bronze Star.

In April 1945, more than 400 Aleuts who had been evacuated to the mainland at the time of the Japanese invasion of the Aleutians returned to their island homes. The Army and the Navy, with the help of Indian Service architects, will rebuild their villages; and Indian Service teachers and special assistants are helping the natives to reestablish themselves.

Because of the great exodus of Indians from the reservations, the attendance at Indian schools has decreased considerably, and many children who left home with their parents have been deprived of schooling. Much of this loss of education may be irreparable, but a new emphasis is now placed on the value of education by those who are returning from the armed services. During the year the Navajos demanded by resolution that the Government keep its pledge of 1868 to furnish a schoolroom for each 30 pupils. There are nearly 20,000 Navajo children of school age, but the school facilities will accommodate no more than 40 percent of them.

Because of the shortage of personnel, the health service was compelled to limit its activities largely to curative and palliative measures. During the past year, 750,000 out-patient treatments were given, and 40,000 patients were placed in hospitals with a total of 865,000 in-patient days.

During the year a judgment was entered in the United States Court of Claims, allowing the California Indians to recover \$5,024,842.34 in partial satisfaction of claims arising from the Senate's failure in 1852 to ratify 18 treaties made with these tribes.

The Menominee swamp land case was settled by the payment of \$1,590,854.50 from funds of the Menominee Tribe to the State of Wisconsin for 33,870 acres of swamp lands within the boundaries of the Menominee Reservation.

Reexamination of claims for losses of personal property by the Sioux Indians after the "Custer War" resulted in a departmental finding that the claimants were entitled to the additional sum of \$101,630.

Although the Colorado River Reservation was set aside in 1865 for the Indians of the river and its tributaries, colonization of the area was not feasible until, at the outbreak of the war, the completion of the Headgate Rock Dam and its distribution system made possible the irrigation of 100,000 acres of land. In May 1945, the War Relocation Authority returned to the control of the Indian Service 2,000 acres of developed land in the southern area, and 16 Hopi families decided to migrate to the reservation, taking over 40-acre units of irrigated land.

The Division of Territories and Island Possessions

The territorial areas—Alaska, Hawaii, Puerto Rico, and the Virgin Islands—have been the active, strategic outposts of the American people at war. In the interest of the Nation at large, most of them have endured perils, hardships and losses exceeding anything experienced in the continental United States.

All of these areas are trying to establish a more workable formula for their political relationship with the continental United States. Alaska and Hawaii have both had Statehood bills introduced into the Congress, and Puerto Rico has drafted and had introduced a bill which requests the Congress to authorize the people of the island to decide by a plebiscite whether they shall have independence, statehood or a dominion type of government. The Virgin Islanders are preparing amendments to submit to the Congress which would liberalize their organic act.

We should support these 2½ million American citizens who are trying to evolve a sounder relationship with us and who are, in effect, giving us the opportunity to maintain our leadership as a progressive nation. As you stated recently of the Puerto Ricans: "All Americans are grateful to them for their loyalty and service during the war * * * such loyalty should now be rewarded by the opportunity to reinforce their local government and to settle by free choice their future relationships with the United States."

In addition to support from the mainland in the fulfilment of their political aspirations, it is obvious that the territorial areas will deserve our full cooperation in the restoration of their normal economic life.

In Hawaii, agricultural production was hindered from the beginning of the war by acute shortages of labor and equipment. The flourishing fishing industry was practically suspended, and the great influx of troops and war workers caused a crisis in housing and public health.

Puerto Rico and the Virgin Islands, when shipping had been drastically cut, came very close to mass hunger. Shortages of food and essential consumer goods were critical during the early years of the war in both Puerto Rico and the Virgin Islands; and throughout the war their own agriculture and industry have been seriously handicapped by the lack of equipment, supplies and shipping.

The Philippine Commonwealth suffered great physical damage and severe dislocation of its industry and trade. At the end of the Japanese occupation, it was found that sugar cane production in the islands had been disastrously reduced; many sugar mills had been destroyed; and a violent inflation had set in, originating from the flood of Japanese pesos, and intensified by the dire scarcity of essential goods.

In seeking remedies for their wartime losses and dislocations, the governments and people of these American outposts have proceeded

along practical lines. They have shown a readiness to rely to the fullest extent possible on local resources, local devices and local ability. Indeed, one of the significant features of our relations with the territorial areas is the energetic attention given to concrete economic and governmental problems, while at the same time we have engaged in the formulation of a policy looking toward a sound and realistic political relationship.

This direct approach to common problems is characteristic of the close working relationship which the Division of Territories and Island Possessions has helped to develop between the local governments and the mainland. Such activities as those of the Territorial Office of Civilian Defense in Hawaii and the Civilian Food Reserve program in Puerto Rico have strengthened these working relationships during the war. Some of these ties will be broken when the special war services are discontinued. To the normal peacetime problems of economic and governmental development will be added those of recovery from the special losses and dislocations of the war. In dealing with these problems, care must be taken to preserve mutual confidence in inter-governmental cooperation.

The Territory of Alaska, which attracts increasing attention from prospective agricultural settlers, traders, and tourists, will need further assistance in such matters as road surveys, soil management, breeding and feeding of fur animals, experimental fishing, water resources investigations, mineral surveys, topographical mapping, land classification and development of recreational resources. Only by securing such assistance, can the Territory, as well as the 48 States, derive the full benefit from the transfer of population which is likely to occur.

In Hawaii, the problems of housing and public health, which are now extremely critical, will need continued attention for some time after the war. There may be a partial reversal of the wartime influx of workers from the mainland; but, in any case, as a result of the severe impact of the war upon Hawaii's economy, the readjustment of industry and agriculture and the rehabilitation, of returning servicemen and local labor, will present problems calling for real intelligence.

The insular government of Puerto Rico has gone far by its own efforts to encourage the maximum development of resources, to attract suitable industries, to improve labor-employer relations, and to develop sanitation.

In the Virgin Islands, progress is being made toward increased responsibility in the management of local affairs and toward greater economic productivity. But the postwar period will bring difficult problems of readjustment which will be only partially solved by the proposed Federal program for construction of public works, such as health and sanitation facilities. A more complete and explicit policy

is needed with respect to political status and economic development.

In the Philippines, the biggest immediate jobs are the reconstruction of industry, particularly the production of sugar, and the reestablishment of the Commonwealth finances on a sound basis. Difficult questions of war damage compensation and future trade policy will call for close and farsighted cooperation of the two governments.

In every territory certain economic problems will remain for solution, no matter what form of political status may be adopted. It will be fortunate if, as discussions of "statehood," "independence," and "dominion status" proceed, leaders of opinion, in the territories and on the mainland, will continue to give attention to the common economic problems that lie before them.

The War Relocation Authority

The War Relocation Authority, created as an independent agency in the spring of 1942 and brought under the Department of the Interior in February 1944 had, at the close of this fiscal year, assisted in the permanent relocation of 51,412 persons of Japanese ancestry, from the 10 relocation centers which it originally administered.

The original population of these centers was approximately 110,000. The Tule Lake relocation center became a segregation center in the summer of 1943, as a result of the progress of relocation at that time.

The chief objective of the Authority has been to return to the main stream of American life all of those evacuees from the west coast who have not been denied the right to return by the Department of Justice or by the War Department. Most of these latter are among the 17,454 persons remaining at the Tule Lake Center.

The relocation of eligible evacuees was greatly speeded when the Western Defense Command on December 17, 1944, announced that it would rescind its evacuation order on January 2, 1945. On the day following the announcement, December 18, the Director of the Authority announced that the remaining eight relocation centers would be closed in not less than 6 months nor more than 1 year.

The success of the relocation effort is indicated by the fact that during the year 24,679 evacuees did establish themselves outside of centers. And while the movement back to the west coast was slow immediately after the lifting of the ban, by the end of June, 4,922 individuals had resumed residence in the evacuated zone. In this same period, however, 10,176 persons had relocated in other parts of the United States.

Obstacles to a stronger movement back to the coast were met with an energetic program of assistance, and of authentic information to create a more ready acceptance of the returning evacuees. Prejudice was strong in some areas of the west coast, where acts of attempted violence against evacuees were committed, such as shooting at their

homes and planting dynamite. In other instances acts of intimidation were committed. Other serious handicaps were the acute housing shortage and the comparatively large number of evacuees who were in need of public assistance. Farmers among the evacuees also found it difficult to get the necessary equipment to operate their lands.

The well-publicized military record of the more than 20,000 young Nisei men who volunteered for, or were called into the Army after the reinstitution of Selective Service for them, on January 20, 1944, did much to overcome prejudice on the west coast, as did the fact that many of the relocating evacuees went directly or indirectly into war work. Large groups of both citizens and aliens took employment with the Army Ordnance Depots at Tooele, Utah, and Sidney, Nebr.

To overcome the housing difficulty, full time housing experts were attached to various area offices and field offices on the coast, and independent cooperating groups sponsored hostels in key localities in which evacuees could live while finding permanent quarters.

The Authority, in its budget requests, based its needs on an estimated population at its centers of approximately 44,000 by the beginning of the 1946 fiscal year, and as the 1945 fiscal year closed, the population figures were actually close to this total.

Population charts for the centers revealed that a great majority of those who were relocated came from the age group between 18 and 35, leaving the residue of children and older aliens, posing a greater problem in working out relocation plans. Many of the more difficult relocation problems were being solved through the cooperation of Federal, State, and county welfare agencies.

Relocation was materially speeded by the elimination or curtailment of many of the center functions. These included the closing of the schools with the end of the June term, the termination of the agricultural and construction programs, with certain exceptions, and the reduction of maintenance. Mess halls were closed whenever a block population dropped to 125 or fewer. Other functions were greatly restricted as the relocation of persons who were able to work reduced evacuee manpower to a minimum.

By the end of the year a pronounced reluctance on the part of a considerable number of evacuees to leave the centers was being gradually overcome, as they realized that the final closing of the centers was a fixed policy.

The War Relocation Authority completed its first full year of operation of the refugee shelter at Fort Ontario, N. Y., having taken over this responsibility in July of 1944, when approximately 1,000 refugees from Europe arrived there. Problems here were somewhat different from those of the relocation centers. In June the subcommittee of the House Committee on Immigration and Naturalization held a hearing at the shelter to determine the possibility and

advisability of extending immigration status to the residents of the shelter, but had not made its findings public as the fiscal year closed. Fourteen of the refugees returned to Europe during the year and another group was preparing to return in August.

The Office of the Solicitor

The Office of the Solicitor, while continuing to carry its regular load of normal departmental legal work and the extra burdens imposed by war activities in fuel, mineral, territorial and other fields, was able to absorb a new and increasingly heavy and important additional legal responsibility in connection with the departmental and general governmental programs incident to peacetime reconversion.

Most of the proposed reconversion programs under consideration by the Congress are closely interwoven with the regular activities of the Interior Department. For example, the regional authority bills, the bills for the disposal of surplus property, the strategic materials stock-piling bill, and the several bills for scientific research and development. The Department's attorneys examined and analyzed all of the reconversion bills, and all others affecting the Department's activities, prepared committee reports, suggested clarifying amendments, arranged for attendance and testimony of Departmental witnesses before Committees of Congress, and generally advised the interested agencies of the Department with respect to the legal significance of proposed legislation as it might affect their particular activities and existing authorizations.

Documents were drafted incident to the seizure and possession of struck coal mines under various executive orders; plans were developed for the orderly return of eligible relocation center residents to normal communities and for the prompt liquidation of war relocation centers. Bureau of Reclamation attorneys prepared 37 basin reports, to be submitted to Congress, providing for comprehensive postwar plans for the development of water, land and hydroelectric power resources, and they were actively engaged in the legal implementation of the Bureau's vast reclamation programs which had been temporarily halted by War Production Board orders during the war. An important victory was won in the case of *United States v. General Petroleum Corporation, et al*, involving additional oil royalties to the United States in the Kettleman Hills district, California. Regulations were drafted with respect to such matters as grazing under the Taylor Grazing Act; to provide for the reopening of the national parks on a peacetime scale; to anticipate an expected increase in hunting during the 1945-46 season; to relax wartime control of explosives; to improve the control over departmental patents, and many others. Hearings were conducted in Alaska with respect to Indian aboriginal rights

and conferences with territorial and War Department officials culminated in the terminating of martial law in Hawaii. This, briefly, is indicative of the range and variation of the legal affairs that were dealt with through the Solicitor's office.

Conclusion

The foregoing pages provide a documented basis for a truth that can be summed up in a fairly brief sentence: We lack much that we need, and we must get it or else suffer grave consequences in the not very remote future.

If anything remains to be said it is only enough to stress what "we" means, and to point out what the kind of suffering that I have referred to could mean to each one of us.


"We" does not mean the Nation in any life which it may be supposed to live apart from the people themselves. "We" means all of us, and here, if not in Webster, it means each of us. It means we who are free, but who would not be if we were conquered. It means we who have and use a thousand conveniences that are made of metals, but who would not have them if we exhausted our mineral supply.

If we suffered the worst that could befall us, under attack, for a lack of metals we would not merely suffer "an unsuccessful war," nor would we do our suffering academically on a certain page of a school history. We would suffer goosestepping, and we would suffer it in our homes, and in our schools, and in our places of business.

If our shortages of metals were acute enough, even in time of peace, we would not suffer merely from "reduced inventories," or from "a higher cost-of-living index." We would suffer from our inability to get automobiles, refrigerators, washing machines, and other luxuries that have become common place to us, because, in their scarcity, they would be available only at outrageous prices which we could not pay.

All that I can set down by way of a formal conclusion is that the situation with respect to many of the minerals upon which our very manner of living depends is such as to give the United States of America real national concern. If we do not remedy that situation we will most certainly and indisputably wish that we had.

Sincerely yours,

A handwritten signature in cursive script, reading "Harold L. Ickes". The signature is written in dark ink and is positioned above a horizontal line.

Secretary of the Interior.

The Bureau of Reclamation

HARRY W. BASHORE, *Commissioner*



THE Bureau of Reclamation during the fiscal year maintained at record levels its production of food and power for a fighting Nation, and carried forward its plans for further development of Western resources in meeting the problems of peace.

Food production on Federal Reclamation projects during the war years has been stepped up to the highest levels in history. In 1944 the gross value of food and fiber crops reached an all-time peak.

Power plants operated by the Bureau at its great dams in the West have been a major factor in the rapid expansion of war industries in Western States, and the power output of these plants during the past year totaled almost 14 billion kilowatts, most of which went into production of planes, tanks, ships, and other commodities to sustain our fighting forces in all parts of the world.

While directing major attention to its programs in support of the war effort, the Bureau during the year has also made substantial progress on its plans for undertaking a greatly expanded program for development of Western resources during the postwar period. With the end of hostilities the Nation faces not only the problems of the immediate reconversion period, but also the longer range problem of maintaining a high employment and high production economy at a permanent level. The postwar program of the Bureau of Reclamation is designed to gear into both the reconversion period and the leveling-off period which follows it.

That program, outlined before a congressional committee in April, calls for full development of the agricultural and industrial resources of 17 Western States through construction of multiple-purpose projects to provide irrigation, power production, flood control, and other benefits. The Bureau's postwar inventory of projects listed 415 proposed for construction after the war, including those on which work is under way or authorized and those on which studies are still being made. Construction of these projects, estimated to cost nearly 5 billion dollars at 1940 price levels, would provide thousands of jobs, open new lands for settlement by veterans and others, stimulate the development of new industry, and in many other ways help meet

the problems of reconversion and in permanently building for a better stronger America.

The late President Roosevelt, in a letter written a few days before his death to Representative John R. Murdock, chairman of the House Committee on Irrigation and Reclamation, emphasized the importance of Reclamation projects as a means of providing job and farm opportunities for returning veterans. An excerpt from that letter, dated April 10, 1945, is as follows:

As I stated in my message to the Congress of January 13, 1944, demobilization starts long before the war ends, and it is essential that programs of assistance to veterans be authorized and adequately prepared now. One such program has been under active study and is in the advanced stages of planning through the work of the Bureau of Reclamation, Department of the Interior. I have frequently spoken with pride of the accomplishments of this administration in water Reclamation projects. The great Columbia Basin project in the Northwest, the projects in the Missouri River Basin, and others of equal significance, as I said at Chicago on October 28, 1944, are golden opportunities for returning veterans. Such projects constitute great increases in national wealth and income. They also offer splendid opportunities for secure and abundant livelihood to men and women willing to engage in the arduous, though stimulating, task of pioneering these latest frontiers. I commend and urge your favorable consideration of Federal Reclamation projects as an important opportunity for returning veterans.

A program to facilitate settlement of returning veterans on farms can be of great value in assisting them in returning to civilian life. It can also be of great value in the reconversion of our national economy to fully prosperous peacetime basis. Full enjoyment of the great productive resources of this Nation by all of the people requires that all have opportunity to engage in productive labor. The purchasing power created by reclamation projects is a stimulus to industry and commerce, thus promoting full employment throughout the Nation. Those engaged in agricultural production should secure ample livelihood so that they can participate in enjoyment of the products created by full industrial employment. Measures in addition to those dealing with Federal Reclamation projects will be needed to round out a comprehensive program in this regard.

Projects included in the Bureau's inventory are integral parts of programs for coordinated resource development on a basin-wide scale in each of 15 major river valleys in the West. The first of these comprehensive studies and reports was completed during the fiscal year 1944 for the Missouri River Basin, and the Congress approved the joint plan of the Bureau and the Corps of Engineers by passage of the Flood Control Act of 1944. The postwar inventory includes 29 Bureau projects initially authorized for construction in carrying out this coordinated plan.

Production of food and power on 52 operating projects of the Bureau during the year was maintained at record levels, as was generation of power for war production.

Construction activities of the Bureau were continued during the year on a restricted basis, confined mostly to war food and war power projects approved by the War Production Board. Work was halted by War Production Board stop-orders, or deferred because of the war.

more than a billion dollars worth of construction planned by the Bureau. Project planning activities and the preparation of designs and specifications were also carried forward during the year, primarily on projects included in the postwar inventory. Work was hampered by limited funds and the lack of trained personnel.

The Bureau is now resuming construction on a considerable number of projects. Among those slated for early development are the Columbia Basin project in Washington State, the Central Valley project in California and various projects in the initial development stage for the Missouri Basin. The report on the allocation of costs for the Columbia Basin project was submitted to the Congress during the year and repayment contracts setting forth the terms under which water users will repay part of the cost of constructing the irrigation system were to be submitted to landowners in the Basin at a special election in July.

The Federal Government now has an investment of \$952,893,000 in projects built and under construction by the Bureau of Reclamation. The cost of constructing the irrigation features of the projects actually in operation was slightly in excess of \$312,000,000, of which at the end of 1944, more than \$71,000,000 had been repaid by water users under Reclamation law. The gross value of crops produced on these lands for the single year 1944 amounted to more than the cost of building the irrigation systems.

More than 91,000 family-sized farms are provided with irrigation water through the 52 operating projects of the Bureau, and nearly five million people live in the areas served with irrigation and power from its systems.

Disruptions caused by the war have affected the work of the Bureau in many ways. More than 1,800 members of its staff, many of them skilled technicians, joined the armed services. Operations were hampered by shortages of manpower and materials. Needed repairs and maintenance work on irrigation systems and power plants were delayed.

An expanded irrigation acreage and development of other resources is necessary to insure the continued growth of the West. In the Pacific States and several of the Mountain States, population growth has outstripped agricultural production. The drought experiences of the Plains States, on the other hand, point to the need for increased irrigation to stabilize their agriculture and to stimulate development of other resources.

The war has placed a tremendous drain upon our natural resources. It is essential that remaining resources be conserved and utilized to the greatest possible advantage if the Nation is to continue its role of world leadership. To this objective the work of the Bureau of Reclamation is dedicated.

MISSOURI BASIN DEVELOPMENT

The Congress this year called upon the Department of the Interior and the Bureau of Reclamation to shoulder major responsibility for the biggest single development job in the Nation's history—that of harnessing the Missouri River and putting it to work as a constructive force in expanding the agricultural and industrial frontiers of the West.

The Bureau's program to control and put to greater use the waters of one of the country's most unruly and destructive rivers was approved by the Congress in passing the Flood Control Act of 1944, under which the coordinated plan of the Bureau and the Corps of Engineers for development of the Missouri Basin was adopted. The latter agency will be primarily responsible for flood control and navigation projects. The Bureau of Reclamation, working closely with other agencies of the Department of the Interior, will construct projects for irrigation and power development. The Congress authorized an appropriation of \$200,000,000 each for the Bureau and the Corps of Engineers in carrying out the initial phases of the program.

This comprehensive program for coordinated development of Missouri Basin resources surpasses anything of similar nature ever undertaken. It will affect a region embracing approximately one-sixth of the area of the continental United States, extending from the eastern slope of the Rockies in Montana where the Missouri starts its twisting 2,500-mile course, to where it empties into the Mississippi near St. Louis. The drainage area of the river and its tributaries includes 10 States—all of Nebraska, the Great Plains of Montana, North and South Dakota, Wyoming, Colorado, Kansas, parts of Minnesota, Iowa, and Missouri.

The magnitude of the engineering tasks involved in this development program can be realized from the fact that coordinated plans call for the construction of more than 100 dams to create storage reservoirs of 63,000,000 acre-feet capacity, almost equal to the present storage capacity of all present Bureau reservoirs combined. The works to be constructed will provide for irrigation, the development of hydroelectric power, flood control, improved navigation, municipal water supplies, fish and wildlife conservation and opportunities for recreation.

Projects to be constructed under the coordinated plan will aid greatly in stabilizing the agricultural economy of an area which has known the devastating effects of both droughts and floods. The projects proposed will provide for the irrigation of 4,760,000 acres of moisture-famished land never before irrigated, and for supplemental water for 547,000 acres now inadequately irrigated. A total of more than 150 major and subsidiary units for irrigation are contemplated in the seven arid or semiarid States of the Basin. Hydro-

electric plants with a capacity of 789,750 kilowatts and a power transmission grid are included. The estimated annual output of the power plants would approximate 4½ billion kilowatt hours.

In the initial stage of the unified plan the Congress authorized the construction by the Bureau of Reclamation of 29 units and a power transmission grid. When completed, these will irrigate 2,836,000 acres, and allow for installed power capacity of 321,000 kilowatts. The Bureau has started work on the plans for the first 11 units with a view to having them ready for beginning of construction in the next fiscal year.

The 29 initial Reclamation projects authorized by the Congress for construction in the Missouri River Basin are:

Kansas-Nebraska: Bostwick, Cedar Bluff, Frenchman-Cambridge, Kirwin, North Republican (Wray) (Colorado-Nebraska), pumping units for underground water in Republican Basin.

Montana: Canyon Ferry Reservoir, Glasgow Bench pumping, Hardin (including Yellowtail Dam), Marias, Missouri-Souris (Montana division), South Bench, and Yellowstone River pumping units.

North Dakota: Heart River, Knife River, Missouri-Souris (North Dakota division), and five Missouri River pumping units.

South Dakota: Angostura, Grand River (Shadehill-Bluehorse), Oahe (James River), and Rapid Valley (including Brennan Reservoir).

Wyoming: Big Horn pumping units, Big Horn project (Boysen Dam), Glendo Reservoir, Kortes, Owl Creek, Paintrock, Riverton, and Shoshone project extensions.

Transmission lines to carry energy generated by Bureau plants complete the list of initial projects.

The table below summarizes by states the irrigation and power development features of proposed Bureau projects under the coordinated plan:

State	New irrigated land	Supplemental supplies	Power plants	Installed capacity
	<i>Acres</i>	<i>Acres</i>		<i>Kilowatts</i>
Montana.....	967, 130	346, 800	6	308, 500
Wyoming.....	281, 560	167, 400	8	217, 000
Colorado.....	101, 280	1, 719		
North Dakota.....	1, 266, 440		3	458, 267
South Dakota.....	961, 210	11, 300	5	510, 500
Nebraska.....	989, 445	19, 930		
Kansas.....	193, 335	165		
Total.....	4, 760, 400	547, 304	22	1, 494, 267

The Flood Control Act, putting the congressional stamp of approval on the coordinated plan for Missouri Basin development, became law in December 1944. Two weeks later the Bureau called key members of its regional staffs at Billings and Denver to Washington for conferences with the Commissioner's staff to map out a program for starting work. A second conference was held at Denver in June at

which further plans were made, policies formulated, and the general organizational set-up for carrying out the program agreed upon. Also selected was a group of projects, from among the 29 authorized, on which construction could be started first.

For this comprehensive development job the Bureau will have the assistance and cooperation of many Federal agencies in addition to those in the Department of the Interior, and of State and local organizations in the Missouri Basin. Interior agencies working with the Bureau include the Geological Survey, National Park Service, Fish and Wildlife Service, Bureau of Mines, Office of Indian Affairs, General Land Office, and the Grazing Service, working through the Water Resources Committee of the Department.

Plans for project development are also coordinated through the Federal Inter-Agency River Basin Committee made up of representatives of the Department of the Interior, the War Department, the Department of Agriculture, and the Federal Power Commission. In April, a special subcommittee of this latter agency was set up to deal specifically with Missouri Basin developments. Known as the Missouri Basin Inter-Agency Committee, it is made up of representatives of the 4 Federal agencies named above and 4 governors representing the 10 Missouri Basin States.

The cost of constructing the projects approved under the coordinated plan is estimated at approximately 1½ billion dollars, based on 1940 prices. Many of the multiple-purpose projects to be built would be self-liquidating, and a major portion of the total investment would be returned to the Federal Treasury through payments by water users and through sales of electric power. Construction costs of flood control and navigation projects proposed under the plan would not be directly repayable but yield benefits far in excess of costs.

Construction of the initial projects in the Bureau's program for Missouri Basin development will be started as soon as the Congress makes the necessary appropriations and the manpower and materials become available.

The impact which a completed program of this magnitude will have upon the national economy can readily be imagined. It will provide thousands of jobs for returning servicemen, war workers, and others, not only at construction sites but at supply centers many miles away. The development of irrigation projects will help to stabilize the agricultural economy of a vast area periodically scourged by drought. The availability of low-cost hydroelectric power will stimulate business and industry, make possible development of untapped natural resources, and lighten the burdens of farm and city dwellers. Storage reservoirs to be constructed will minimize greatly the danger of floods in the lower reaches of the river. Approximately 53,000 new irrigated farms will be created. Population will be increased. Purchasing

power in the Missouri Basin States for commodities produced in other parts of the country will be expanded by many millions of dollars annually.

FOOD FOR A FIGHTING NATION

Food is as important in war as men and machines are. The men and women on the farms of America are as truly "war workers" as those employed in shops and factories to turn out planes and tanks. And wherever our fighting men have gone on all the battle fronts they have been the best fed, the best clothed, and the best equipped troops ever mobilized.

To make possible that achievement, the farm families of America have made a record in the production of food and fiber that is without parallel in the Nation's history. They have provided not only for the needs of our fighting forces but for our allies and the civilian population here at home.

The part which farmers on lands irrigated by Federal Reclamation projects have played in that record-breaking achievement is outstanding. The value of crops produced on Bureau-irrigated lands has more than doubled during the war years, partly reflected in increased market prices but also due to greatly increased production of war-essential crops and to additional acreage brought under irrigation.

CROP VALUES HIT RECORD LEVEL

During the past fiscal year, more than 4 million acres of land were served with irrigation water from Bureau projects, representing an increase of 759,000 acres over 1941 and 125,000 acres more than in 1943. The value of crops produced hit an all-time high of \$411,226,000, compared to \$159,886,000 in the pre-war year of 1941.

In meeting wartime food needs, farmers on Reclamation lands during 1944 produced 57,122,000 bushels of potatoes, 1,941,000 tons of sugar beets, 6,495,000 bushels of onions, 3,674,000 bushels of beans, 36,672,000 bushels of grain, and 49,000,000 bushels of truck crops. To maintain production of meat and dairy products at a high level, they also produced 4,360,000 tons of forage crops, including 3,830,000 tons of alfalfa hay. Production of apples, oranges, grapefruit, peaches, and other fruits and berries totaled 729,000 tons, and crops produced for seed amounted to 4,512,000 bushels.

The average per acre value of crops on Bureau-irrigated lands in 1944 was also the highest on record, an average of \$99.27 per acre, compared with a per acre average of \$47.30 in 1941. The highest average crop value in 1944 was reported for the Tieton division of the Yakima project at \$598.34 per acre, closely followed by the Okanogan project at \$592.32 per acre. Both are apple-growing districts in the State of Washington.

PROJECTS HAVE \$100-PER-ACRE RETURN

Gross crop values exceeding an average of \$100 per acre also were reported on the following projects: The Salt River (Arizona); Yuma (Arizona-California); Orland, Imperial Irrigation District and Central Valley (California); Fruitgrowers Dam and the Orchard Mesa division of the Grand Valley project (Colorado); Rio Grande (New Mexico-Texas); Klamath (Oregon-California); Owyhee Ditch Company (Oregon-Idaho); and Provo River and Weber River (Utah).

Tonnage of food and forage crops increased from 10,660,000 tons in 1943 to 11,369,000 tons in 1944. Of the cultivated area 26.1 percent was in alfalfa with production valued at \$67,978,000, 4.9 percent in potatoes valued at \$50,211,000, and 4.3 percent in seed crops with a value of \$24,333,000. Gross value of other crops produced in 1944 were: cotton, \$18,446,000; beans, \$13,363,000; sugar beets, \$20,623,000; truck crops, \$59,178,000; grains, \$39,610,000; and fruit, \$56,140,000. Principal volume increases occurred in alfalfa hay, grains, truck crops, and fruit.

The returns cited are exclusive of the values of livestock fattened on Reclamation projects and of dairy and poultry products. These would increase quoted totals by more than 25 percent.

TABLE 1.—Reclamation areas and crop returns, calendar year 1944 ¹

	Projects entirely constructed by the Bureau				
	Irrigable area ²	Irrigated area	Land subject to construction charges		
			Net area in cultivation	Crop values	
				Total	Per acre
Total, regular projects	<i>Acres</i> 2,394,246	<i>Acres</i> 1,918,829	<i>Acres</i> 1,921,437	\$188,184,336	\$97.94
Total, storage projects	521,724	430,917	434,747	31,062,852	71.45
Total, special and Warren Act lands	1,969,281	1,694,861	1,664,069	186,543,084	112.10
Additional areas reported:					
Temporarily suspended		53,295	53,295	1,360,540	25.33
Leased areas, War Relocation Authority Centers, etc.		65,801	65,801	4,075,562	61.94
Grand total, 1944	4,885,251	4,163,703	4,139,349	411,226,364	99.27
Grand total, 1943	4,807,522	4,055,329	4,014,346	388,670,969	96.82
Increase, 1943-44, total	77,729	108,374	125,003	22,555,395	2.45

¹ A detailed table of area and returns by individual projects is available on request from the Bureau of Reclamation, Washington, D. C.

² Area for which Bureau is prepared to supply water.

NOTE.—Per-acre value based on net area in cultivation.

LANDS LEASED FOR GRAZING

The Bureau had under lease during the calendar year 1944 approximately 964,000 acres, of which 799,000 acres were leased for grazing purposes; 64,000 acres for agricultural use; and 101,000 acres for other special uses. The above figures include 89,195 acres of patented land which have been acquired by the Bureau in connection

TABLE 2.—Cumulative crop values, 1906-44

Year	Federal irrigation projects ¹				Warren Act lands and special contractors				Entire area			
	Irrigated acreage	Net area in cultivation	Total crop value		Irrigated acreage	Net area in cultivation	Total crop value		Irrigated acreage	Net area in cultivation	Total crop value	
			For year	Cumulative total			For year	Cumulative total			For year	Cumulative total
1906	22,300	Acres 20,100	\$244,900	\$5,005,360					22,300	Acres 20,100	\$244,900	\$5,005,360
1907	187,028	169,460	4,760,460	12,641,248					187,028	169,460	4,760,460	12,641,248
1908	209,549	190,500	7,635,888	28,501,911					289,549	280,500	7,635,888	28,501,911
1909	410,628	369,500	11,920,663	37,506,560					410,628	369,500	11,920,663	37,506,560
1910	471,423	413,000	12,944,039	50,502,991					471,423	413,000	12,944,039	50,502,991
1911	562,311	470,100	13,066,441	66,600,125					562,311	470,100	13,066,441	66,600,125
1912	614,477	540,000	16,007,134	82,276,534					614,477	540,000	16,007,134	82,276,534
1913	694,142	576,409	15,676,409	98,752,051					694,142	576,409	15,676,409	98,752,051
1914	761,271	703,424	16,475,517	116,916,503					761,271	703,424	16,475,517	116,916,503
1915	810,649	780,035	18,164,452	149,732,472					810,649	780,035	18,164,452	149,732,472
1916	922,821	858,291	32,815,972	206,104,788					922,821	858,291	32,815,972	206,104,788
1917	1,026,663	966,784	56,462,313	261,941,337					1,026,663	966,784	56,462,313	261,941,337
1918	1,187,265	1,113,469	88,974,137	361,940,321					1,187,265	1,113,469	88,974,137	361,940,321
1919	1,223,480	1,153,820	66,171,650	428,161,971					1,223,480	1,153,820	66,171,650	428,161,971
1920	1,227,500	1,157,900	48,630,300	528,143,121					1,227,500	1,157,900	48,630,300	528,143,121
1921	1,213,700	1,179,570	62,046,300	600,189,421					1,213,700	1,179,570	62,046,300	600,189,421
1922	1,201,300	1,160,100	50,360,550	650,550,000					1,201,300	1,160,100	50,360,550	650,550,000
1923	1,201,300	1,160,100	50,360,550	650,550,000					1,201,300	1,160,100	50,360,550	650,550,000
1924	1,201,300	1,160,100	50,360,550	650,550,000					1,201,300	1,160,100	50,360,550	650,550,000
1925	1,201,300	1,160,100	50,360,550	650,550,000					1,201,300	1,160,100	50,360,550	650,550,000
1926	1,201,300	1,160,100	50,360,550	650,550,000					1,201,300	1,160,100	50,360,550	650,550,000
1927	1,201,300	1,160,100	50,360,550	650,550,000					1,201,300	1,160,100	50,360,550	650,550,000
1928	1,201,300	1,160,100	50,360,550	650,550,000					1,201,300	1,160,100	50,360,550	650,550,000
1929	1,201,300	1,160,100	50,360,550	650,550,000					1,201,300	1,160,100	50,360,550	650,550,000
1930	1,201,300	1,160,100	50,360,550	650,550,000					1,201,300	1,160,100	50,360,550	650,550,000
1931	1,201,300	1,160,100	50,360,550	650,550,000					1,201,300	1,160,100	50,360,550	650,550,000
1932	1,201,300	1,160,100	50,360,550	650,550,000					1,201,300	1,160,100	50,360,550	650,550,000
1933	1,201,300	1,160,100	50,360,550	650,550,000					1,201,300	1,160,100	50,360,550	650,550,000
1934	1,201,300	1,160,100	50,360,550	650,550,000					1,201,300	1,160,100	50,360,550	650,550,000
1935	1,201,300	1,160,100	50,360,550	650,550,000					1,201,300	1,160,100	50,360,550	650,550,000
1936	1,201,300	1,160,100	50,360,550	650,550,000					1,201,300	1,160,100	50,360,550	650,550,000
1937	1,201,300	1,160,100	50,360,550	650,550,000					1,201,300	1,160,100	50,360,550	650,550,000
1938	1,201,300	1,160,100	50,360,550	650,550,000					1,201,300	1,160,100	50,360,550	650,550,000
1939	1,201,300	1,160,100	50,360,550	650,550,000					1,201,300	1,160,100	50,360,550	650,550,000
1940	1,201,300	1,160,100	50,360,550	650,550,000					1,201,300	1,160,100	50,360,550	650,550,000
1941	1,201,300	1,160,100	50,360,550	650,550,000					1,201,300	1,160,100	50,360,550	650,550,000
1942	1,201,300	1,160,100	50,360,550	650,550,000					1,201,300	1,160,100	50,360,550	650,550,000
1943	1,201,300	1,160,100	50,360,550	650,550,000					1,201,300	1,160,100	50,360,550	650,550,000
1944	1,201,300	1,160,100	50,360,550	650,550,000					1,201,300	1,160,100	50,360,550	650,550,000

¹ Includes projects constructed by the United States and those for which supplemental water is furnished from storage works built by United States.

* Estimated.

with its projects. Revenues received by the United States for use of land in 1944 totaled \$195,805. The majority of the leased lands are withdrawn in connection with operation of completed projects. In addition, more than 700,000 acres of reclamation withdrawn land is now administered by the Grazing Service, with transfer of revenues to the Reclamation Fund. Under an agreement entered into February 28, 1945, between the Bureau and the General Land Office, vacant public lands under reclamation withdrawal may be temporarily transferred to the administration of the General Land Office until needed for reclamation purposes. At the end of the fiscal year, approximately 44,000 acres of such lands had been so transferred.

WORLD'S LARGEST POWER PRODUCER

Through a spectacular expansion in its generating facilities to meet the war emergency the Bureau of Reclamation has become the largest power producer in the world. From plants operating on its projects came nearly 14 billion kilowatt-hours of electric energy during the past fiscal year, much of it to war industries for the manufacture of planes and ships, aluminum, magnesium, and other materials and equipment for the fighting forces. Production of electric energy at Bureau projects has quadrupled since Pearl Harbor.

When the war is over this tremendous capacity for power production will be one of the most important factors in the continued industrial and agricultural expansion of the West. It will provide jobs, stimulate the establishment of new industry, aid in developing mineral resources and, in general, serve as the foundation for the establishment of a more balanced economy throughout the West.

POWER FOR WAR

From its beginning in the power field in 1909 with the 6,000-kilowatt Minidoka project plant in Idaho, the Bureau's installed capacity has grown to 2,439,300 kilowatts. This growth was required to keep pace with the needs for electrical power in areas served by reclamation projects and played a vital role in the tremendous expansion of war industries in the West. To meet demands, the installed capacity of Bureau hydroelectric plants was increased since 1941 by nearly a million and a half kilowatts, a gain of nearly 65 percent.

In the fiscal year 1945 the combined output of the plants operating on Bureau projects was approximately 14,000,000,000 kilowatt-hours. Revenues from the sale of energy were in excess of \$20,000,000.

Construction of new plant facilities has been virtually halted since 1942 because of the need for diverting critical materials to other war uses. During the past year an additional 82,500-kilowatt unit was installed in the plant at Boulder Dam, which has supplied a steady

stream of energy to aircraft and shipbuilding facilities, magnesium plants, and other basic industries. The plant at Boulder is the world's largest, and has a capacity of 1,034,800 kilowatts. The Shasta Dam power plant in northern California completed its first full year of operation with an output of 739,000,000 kilowatt-hours. Power from Grand Coulee Dam continued to be the mainstay of booming war industries in the Pacific Northwest. More than one-third of the aluminum used in airplane construction in the United States was produced from power generated by the Grand Coulee-Bonneville system. From Grand Coulee also came the large blocks of power for other important war purposes.

During the year the Bureau also completed construction of the 97-mile transmission line to Oroville which made possible the delivery of Shasta power to the connecting lines of the Pacific Gas & Electric Co. and thence into northern California war plants. The company serves as the marketing agency for this power under a wartime contract. The availability of Shasta power resulted in saving thousands of barrels of fuel oil that would otherwise have been required had the same energy been generated by steam plants.

POWER FOR PEACE

The postwar program of the Bureau calls for increasing the capacity of present plants to 4,000,000 kilowatts, principally by adding generating units for which space has been provided in constructed plants. Additional installations at projects included in the postwar inventory call for generating plants which will give the Bureau of Reclamation a total power capacity of about 9,000,000 kilowatts. Of this, about a million and a half kilowatts will be in plants strategically located in states of the Missouri Basin to aid in the further development of that great area.

The demands of wartime have served to emphasize what officials of the Bureau of Reclamation have long recognized—the importance of developing the power resources of our western rivers along with the utilization of their waters for irrigation and other purposes. The availability of such low-cost power is essential on many projects for irrigation pumping, but it is even more important as a stimulant to the development of industry and business to go hand in hand with agricultural expansion in establishing a balanced economy.

Revenues from the sale of such power helps repay to the Federal Treasury a major portion of the cost of constructing many reclamation projects. Without that source of repayment revenue, projects which are now contributing so much to the Nation's agricultural production and providing homes and jobs for thousands of people could not have been constructed without a much greater net cost.

Under reclamation law, most of the investment which the Govern-

ment makes in these irrigation projects is repaid over a period of from 40 to 60 years by water users, and the revenue from sale of electric energy to municipalities and individuals.

The mighty contribution which the West has made to war production since 1941 would not have been possible without the power-producing facilities of Bureau projects, and after the war they will play an even more important role in developing the great latent resources of the vast area between the Mississippi and the Pacific.

POSTWAR PLANS TO DEVELOP THE WEST

While pushing its programs to aid in winning the war the Bureau of Reclamation also laid a solid foundation for a program to meet the problems of peace. This program was presented to the Congress in April in the form of an inventory of 415 irrigation and multiple-purpose projects which the Bureau is prepared to undertake in further developing the resources of 17 Western States and to provide jobs and farms for thousands of returning servicemen and demobilized war workers.

This inventory of projects included more than 100 which have already been authorized by the Congress, 29 of them as part of the Bureau's coordinated program for development of the Missouri Basin.

Construction of these authorized and proposed projects would provide jobs at peak employment for more than 400,000 workers at construction sites and a great many more workers in factories, mines, and transportation systems throughout the country.

The cost of constructing these projects—those authorized and those under study—is estimated at close to 5 billion dollars, based on 1940 costs. The estimated construction cost to complete projects already authorized by the Congress is \$1,337,701,000.

Nearly 200,000 irrigated farms would be made available for settlement by veterans and others upon the completion of these projects. They would bring water to nearly 11 million acres which have never before been irrigated, and supplemental water to an additional 11 million acres which now have inadequate water supplies. Thus, a total of 21 million acres would be served in stabilizing the agricultural economy of these 17 Western States and contributing to the welfare of the Nation as a whole.

Another very important contribution which these projects would make in developing the resources of the West to the benefit of the whole country is the tremendous increase in the output of electrical energy which would be made possible by harnessing these western rivers through multiple-purpose projects. Power plants on Bureau projects now have an installed capacity of 2,439,300 kilowatts, with

a total output in 1944 of nearly 14 billion kilowatt-hours. The postwar program calls for increasing the capacity of present plants to 4,863,000 kilowatts principally by adding generating units for which space was provided in original construction. Additional installations in the postwar inventory call for the addition of generating units which would give Bureau of Reclamation plants a total capacity of 9,324,000 kilowatts.

A summary of the Bureau's postwar inventory of projects is given below:

State	Number of projects	Irrigation		Power		Over-all remaining costs, 1940 prices
		New lands	Supplemental water	Installation authorized projects	Estimated firm projects under study	
		<i>Acres</i>	<i>Acres</i>	<i>Kilowatts</i>	<i>Kilowatts</i>	
Arizona.....	19	383,050	602,800	225,000	1,877,200	\$1,268,219,000
California.....	37	2,233,900	4,475,000	686,500	627,400	836,494,000
Colorado.....	21	797,385	1,981,740	144,900	574,000	525,017,000
Idaho.....	22	319,180	1,163,715	100,500	138,620	190,142,200
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Montana.....	96	1,127,526	294,500	252,000	31,000	265,273,000
Nebraska.....	16	337,922	57,430	2,000	75,000	77,955,000
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Washington.....	5	1,116,000	252,000	852,000	622,000	411,488,000
Wyoming.....	68	743,000	587,700	40,000	75,000	239,576,000
Total.....	415	10,809,081	10,617,078	2,612,250	4,271,720	4,792,371,000

¹ Total includes individual units of some major projects. Miscellaneous projects not included.

The speed with which construction of these projects can be undertaken will depend largely upon the action of the Congress in making the necessary appropriations and upon the availability of manpower and materials. Work is in progress under war food and war power programs on many of the authorized projects and work on others has been halted or deferred because of the war.

The development program proposed by the Bureau is important both from the standpoint of what it can do toward helping the Nation in meeting some of the immediate reconversion problems, and also because of its promise for long-range development of the agricultural and industrial resources of the West. It is a program that permits a quick get-away. Provided with funds and manpower to complete field investigations and preconstruction work, as well as appropriations for actual construction, the Bureau could put from 150,000 to 200,000 men to work at project sites the first year. Peak on-site employment could be reached in the second or third year. Although construction would be centered in the Western States, more than half of the resulting employment would be in mines, mills, and factories of the

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a total output in 1944 of nearly 14 billion kilowatt-hours. The postwar program calls for increasing the capacity of present plants to 4,863,000 kilowatts principally by adding generating units for which space was provided in original construction. Additional installations in the postwar inventory call for the addition of generating units which would give Bureau of Reclamation plants a total capacity of 9,324,000 kilowatts.

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Midwest, East, and South. It would mean jobs for thousands of workers in manufacturing materials and machinery—iron and steel products, cement, electrical equipment and supplies, foundry and machine-shop products, and lumber, from their beginning as raw materials, their transportation to the factory for fabrication, their processing, and again their transportation to the place where they are used. Thus every State is affected by western construction.

The benefits that would be derived from these projects would not end with the construction of the engineering works but go on for generation after generation to increase agricultural production, stimulate industry, increase purchasing power, create new opportunities for business, trade and professional people in towns serving project areas. So not only the West but the entire Nation would be benefited permanently.

For 43 years the Bureau of Reclamation has been working on programs for developing the land and water resources of the West. The value of those developments has been effectively demonstrated during the war. The need for continuing and expanding such developments has also been demonstrated. At present there are about 2½ million more people living in the 11 far Western States than there were before the war. This is a population increase of 17.8 percent, compared with a national increase in the same time of only seven-tenths of 1 percent. Many of these new residents of the West will remain in the region. In addition more than 1,000,000 western boys will be demobilized from the armed forces. They will want jobs, they will want opportunities to start farming, to practice their trades and professions, to open business establishments. An increase in the basic irrigated agriculture of this area will therefore be necessary to support and sustain the growth and the continuing industrial expansion of these States. It is to meet this challenge and to open up a new frontier of opportunity in the West that the Bureau of Reclamation presents its postwar program.

RIVER BASIN STUDIES PROGRESS

The Branch of Project Planning gave major attention during the year to projects proposed for construction after the war.

Field staffs concentrated on the completion of the comprehensive engineering and economic investigations and reports on 15 major river basins in the West, in addition to sub-basin and project studies. The objective of these studies is to present a comprehensive and overall plan of development on a basin-wide scale to bind the various projects and units into an orderly and logical program for the most effective utilization of land and water resources.

The first of these basin reports—covering the Missouri River Basin—was presented to the Congress last year (S. Doc. 191). Further studies of projects and sub-basins in the Missouri Valley are continuing. Reports on other major western river basins in various stages of completion by the Bureau are: Columbia River Basin, Rogue River Basin, Central Valley, Santa Barbara County, Russian River Basin, Lower Colorado River Basin, Upper Colorado River Basin, Great Salt Lake Basin, Nueces River Basin, Rio Grande Basin, Red River Basin, Pecos River Basin, Guadalupe River Basin, Colorado River (Texas) Basin, and Arkansas River Basin.

SPECIAL STUDIES TO AID SETTLERS

In addition to these basin reports and studies of individual projects in the postwar inventory, the Bureau brought to substantial completion during the year its special studies of the two largest Reclamation projects on its postwar development schedule, the Columbia Basin project in south-central Washington and the Central Valley project in California.

Published during the year were 3 of the 28 special reports prepared by the Columbia Basin Joint Investigations Committees—Types of Farming, Rural Recreational Areas, and Insuring Proper Land Use. Additional studies in the series are scheduled for publication during the coming fiscal year.

Also completed during the year were similar special studies for aid to settlers on the Central Valley project. The studies embrace a great volume of factual material on all phases of the proposed development of the project and were prepared by the Bureau in cooperation with a great many Federal and State agencies. Publication of some of the Central Valley studies is also planned for next year.

CONSTRUCTION ACTIVITIES LIMITED

Construction activities of the Bureau continued during the year on a restricted basis, confined almost entirely to projects under war food and war power programs.

The 37-mile Madera Canal on the Central Valley project was completed late in the fiscal year. It will provide water for irrigating about 20,000 acres of new land and supplemental water for 80,000 acres in the fertile San Joaquin Valley. An application to start construction on the 160-mile Friant-Kern Canal was pending before the War Production Board. Twenty-nine projects were cleared under the war food program.

Ten dams were partially completed at the end of the year, as follows:

Concrete dams

Dam	Reservoir capacity	Height	Complete
	<i>Acre feet</i>	<i>Feet</i>	<i>Percent</i>
Altus.....	151,650	110	98
Keswick.....	23,689	130	8

Earth dams

Anderson Ranch.....	500,000	456	66
Newton.....	5,500	101	97
Deerfield.....	15,000	120	75
Scotfield.....	65,000	68	50
Wickiup.....	180,000	100	8
Box Butte.....	31,500	66	75
Jackson Gulch.....	10,000	150	20
Shadow Mountain.....	15,000	48	60

A total of 144 miles of transmission lines was completed and construction of an additional 308 miles was in progress. Fifty miles of canals were built and work on other water distribution facilities for war food production was continued. Construction during the year involved the use of more than 300,000 barrels of cement, and 220,000 cubic yards of concrete were placed.

Construction of Anderson Ranch Dam on the Boise project in Idaho passed the half-way mark. When completed it will be the highest earthfill dam in the world. The reservoir created will provide flood control, and store irrigation water for 290,000 acres now receiving an inadequate supply. On the Deschutes project in Oregon an earth dam is under construction to provide irrigation for approximately 20,000 acres, and construction also was continued on the canals and distribution system for irrigating 32,000 acres on the Yakima Roza project in Washington.

Clearance was granted for the installation of additional equipment for the power plant and for emergency repair work on the spillway bucket at Grand Coulee Dam. On the Tucumcari project in New Mexico, work was completed on the first section of the Conchas Canal to provide irrigation water for an initial block of 7,000 acres.

Construction also progressed on the Gila project in Arizona and on the Coachella Canal in Southern California. Other construction included guniting over the dry rock paving in the desilting basins at the headwaters of the All-American canal, preparation of the designs and specifications for the construction of the \$17,000,000 San Diego Aqueduct, continued construction on the Salt Lake Aqueduct, flood control work on the Colorado River, and concrete lining work on the 13-mile Alva B. Adams Tunnel under the Continental Divide.

A limited program of construction was also carried on at Green Mountain and Shadow Mountain Dams on the Colorado-Big Thomp-

son project in Colorado, and on the following projects cleared for construction under the war food program: Rapid Valley, S. Dak., Newton and Scofield, Utah, Mirage Flats, Nebr., Mancos, Colo., and Lugert-Altus, Okla.

DESIGNS PREPARED FOR POSTWAR PROJECTS

The Branch of Design and Construction concentrated on the preparation of designs for postwar projects, so that work might begin on a considerable volume of construction whenever war conditions permit. In planning for this postwar development of land and water resources, preliminary designs and estimates were made for 15 concrete and 10 earth dams, 40 power plants, 9 pumping plants, 2 water supply systems, and for canals and water distribution facilities on 15 projects. In addition to these, design studies were started on features of numerous other postwar Reclamation projects.

Primarily, construction work on projects authorized by the War Production Board has been for the purpose of food and power production. The War Production Board authorized work on 21 Bureau projects during the fiscal year, but due to labor and materials shortages, some projects did not progress as planned. Efforts to conserve critical war materials has resulted in increased construction costs on some project features and at times has necessitated design changes.

TECHNICAL ADVANCES

Outstanding technical advances included the development of the hollow-jet regulating valve, and the development of the transformer reactance voltage-drop compensator. The hollow-jet valve will provide more economical installation and maintenance and improved operation for water outlet regulation. The voltage-drop compensator permits the adjustment of electric potential measuring devices in about one-tenth the time required by previous methods. During the year an inexpensive integrating machine was developed which will materially facilitate computations for design where differential equations are involved and which has possibilities for application in mathematical studies elsewhere.

BUREAU AIDS OTHER UNITED STATES AGENCIES

During the war, Bureau engineering and laboratory personnel and facilities were called upon to assist the War and Navy Departments, as well as other Government agencies and private corporations concerned with the war program, in solving a wide diversity of numerous technical engineering problems.

The Bureau cooperated with the Bureau of Mines by furnishing power for research, and with the Geological Survey in exploration for

strategic minerals, by providing technical assistance and laboratory facilities. The Bureau cooperated also with the War Department, the Geological Survey, and the Department of Agriculture in interchange of information and technical data.

WORLD'S BIGGEST DAMS

The engineering accomplishments of the Bureau of Reclamation are known the world over. Its engineers have tamed the mighty rivers in the West and put them to work at transforming barren lands into productive farms and to producing power for man. The three biggest concrete dams in the world have been built by the Bureau of Reclamation—Grand Coulee Dam on the Columbia River in Washington, Shasta Dam on the Sacramento River in California, and Boulder Dam on the Colorado River between Arizona and Nevada.

The Bureau has built 15,495 miles of irrigation canals—enough to cross the continent five times. The storage reservoirs behind these dams have a capacity of 66,558,840 acre-feet. It has built 347 tunnels with a combined length of 560,271 feet. Operating on its projects are hydroelectric plants with an installed capacity of 2,439,300 kilowatts, part of the energy produced being marketed over 2,164 miles of transmission lines built by the Bureau.

In the construction of its projects the Bureau has excavated 606,313,120 cubic yards of earth and rock, poured 33,671,861 cubic yards of concrete, used 38,289,133 barrels of cement. It has built 209,016 canal structures, 5,196 miles of waste water ditches and drains, 13,676 bridges, 23,620 culverts, 6,310 flumes with a combined length of 873,989 feet, and 331 pumping plants.

OPERATION AND MAINTENANCE PROGRAM

Operation and maintenance activities on the 52 operating Federal reclamation projects were devoted first and foremost to furnishing irrigation service needed to maintain record-breaking agricultural crop production. The stabilization of these projects to protect Federal investment is important, as are also steps which have been taken to aid in assuring the success of the water users through improved irrigation practices, land-use and related activities, and settlement.

A special effort was made again during the year to provide for full use of Reclamation withdrawn lands for grazing purposes to support the livestock production in the West.

Activities carried on in the field by this branch of the Bureau of Reclamation for the benefit of water users and to facilitate pro-

operations included: (a) programs for improved operations of projects and preparations for operations, land use, and settlement on projects under construction or authorized; (b) land reclassifications; (c) thorough economic analyses in connection with the negotiation of amendatory repayment contracts and the deferment of construction charges. Plans for the land purchase, development and settlement of the Columbia Basin project were a major goal. Cooperation with State agricultural colleges and other agencies was advanced.

Field work was completed or in progress on the reclassification of irrigable lands on 16 projects or divisions of projects, involving approximately 309,000 acres.

FIELD ORGANIZATIONS ESTABLISHED

Progress was made during the year in setting up operation and maintenance organizations in regional offices. This was in line with the decentralization program of the Bureau to place supervision and contacts closer to operations and to the water users affected, and also to prepare for accelerated operation and maintenance programs that will be needed with the end of the war in connection with project settlement.

The Operation and Maintenance branch was transferred from Denver to Washington during the year. The work of the branch has been primarily directed at (1) the delegating of direct supervisory responsibility of field operations to regional and project offices; (2) development of programs with emphasis on land-use and "the human side" of reclamation, particularly with respect to aiding veterans in settling on irrigated farms, and (3) the review of repayment contracts to determine the need for adjustment in repayment schedules, based on the ability of water users to meet such payments.

AMENDATORY REPAYMENT CONTRACTS

Section 17 (b) of the Reclamation Project Act of 1939 authorized temporary relief from payment of accrued construction charges for each of the years 1939 to 1943, inclusive, in cases where such payments could not be met due to circumstances beyond the control of water users. During the fiscal year, five water users' organizations submitted applications for relief from payments totaling \$209,001.30. Four of the five requests concerned 1944 construction installments. No legislation existed for consideration of these requests until passage of Public Law 39 (79th Cong., 1st sess.) on April 24, 1945.

Action taken during the fiscal year to defer construction charge payments granted relief to five water users' organizations, for 1942 and 1943 installments, in the total amount of \$208,214.41. Postponements of payments were recommended due to the critical finan-

cial condition of the applicant irrigation districts as a result of a growing season, grasshopper infestation, hailstorms, low production influenced by labor shortages, and other factors. At the close of the fiscal year five applications as to 1944 charges, as well as a request for deferment of 1943 charges, were awaiting final action.

An inventory was prepared early in the year of repayment contracts in force, to be used in the various regions in negotiating amendatory provisions of such contracts. To date, 10 amendatory contracts have been executed under provisions of the Reclamation Project Act of 1916.

WATER CONSERVATION AND UTILIZATION PROGRAM

Work was continued on six projects authorized for construction under this program before the war, and on two new projects on which construction was initiated during the year. Preconstruction activity was under way on four additional projects approved under the war food program.

Projects under construction were: Mirage Flats (Nebraska), Big Rapids No. 2 (Montana), Newton (Utah), Rapid Valley (South Dakota), Mancos (Colorado), Intake (Montana), and the Post Falls unit of the Rathdrum Prairie project (Idaho). Other Water Conservation and Utilization projects cleared for construction are Missoula Valley (Montana), Dodson Pump Unit, Milk River project (Montana), Bitter Root (Montana), and Balmorhea (Texas).

Construction remained at a standstill on the Eden project (Wyoming) and the Fallon Unit of the Buffalo Rapids project (Montana) because of War Production Board stop orders.

WAR RELOCATION CENTERS

Three relocation centers continued to operate on Bureau property during the year. These projects in 1942 became sites for reconstructed barracks-cities to care for more than 35,000 persons of Japanese ancestry evacuated from the West coast. The centers were operated by the War Relocation Authority on the Heart Mountain Division of the Shoshone project (Wyoming), Gooding Division of the Minidoka project (Idaho), and the Tule Lake Division of the Klamath project (California-Oregon).

The population at the first two of these centers has been greatly reduced during the past year through the efforts of the War Relocation Authority in providing resettlement opportunities for evacuee families in many parts of the country. As a result, most of the

acreage in project lands used by residents of the centers to provide food for their own needs, is being turned back to the Bureau.

The Bureau in turn is leasing this land to private operators for continued production of food and forage crops. Both the Heart Mountain and Minidoka centers are scheduled to be closed within the next few months. Part of the irrigation system on each project was developed under the direction of Reclamation engineers, with construction work and farm operations carried on by the evacuees.

C. P. S. CAMPS

On four other Reclamation projects Civilian Public Service crews, under the Selective Service program, have helped to relieve labor shortages in continuing construction and development work. At the Mancos project (Colorado) an average of 149 Civilian Public Service workers were employed during June. Construction of Deerfield Dam on the Rapid Valley project (South Dakota) was continued by Civilian Public Service labor, a 150-man camp being maintained. Approximately 95 Civilian Public Service assignees were employed on the Deschutes (Oregon) project. These men were used for firefighting, operation and maintenance, and clean-up work. During the irrigation season the Department of Agriculture Camp furnished a few Civilian Public Service assignees for similar work on the Buffalo Rapids project (Montana). There were not enough workers available, however, to advance construction on the project.

PLANS FOR VETERAN SETTLEMENT

The branch was actively engaged in developing a program for the settlement of veterans and others on public lands on projects for which irrigation facilities are constructed and in helping irrigation districts and local interests to advance settlement on privately owned lands in projects under construction. Restricted construction of irrigation facilities during the war limited the settlement opportunities that could be made available in 1945-46, but resumption of construction work was expected to increase materially the number of irrigated farms on public and privately owned lands that could be offered. Preference is provided for veterans under existing law in settlement of public lands.

TABLE 3.—Settlement and economic data—1944

State	Project	Irrigated farms		Towns on or tributary to the project		Number of schools	Number of churches	Banks		Number of depositors	Special Warren Act contractors	
		Number	Population	Number	Population			Number	Deposits		Irrigated farms ¹	Population
REGULAR												
Arizona	Salt River.....	12,714	38,000	12	180,015	98	105	7	\$156,059,796	90,000	858	5,529
Arizona	Gila 2	3										
Arizona-California	Yuma	1,690	3,065	5	18,560	14	34	3	(c)	2,900		
California	Grand Valley	513	1,959	6	19,660	17	40	1	3,030,000	11,603	803	6,110
Colorado	Grand Valley 2	1,801	5,106	3	8,140	28	35	3	16,632,813	6,825	171	339
	Uncompahgre	4,236	15,250	16	35,865	118	131	3	7,127,115		4,764	19,516
Idaho	Boise	3,528	11,568	10	14,523	36	73	6	(c)		9,708	44,065
	Minidoka	320	1,136	5	4,223	18	13	4	5,908,108	5,796		
Montana	Butte Road	43	185	1	100	1	1					
	Frenchtown	614	1,377	5	632	7	6	1	465,917	450		
	Huntley	676	2,536	15	10,939	29	38	7	15,724,072	8,556		
	Milk River	1,069	2,543	5	882	10	15	1	(c)			
Montana-North Dakota	Sun River	680	2,171	7	4,225	17	22	3	5,703,865	4,800		
Nebraska	Lower Yellow-stone	2,717	7,815	16	27,839	72	67	9	25,180,973	18,500		
Nebraska-Wyoming	North Platte	766	2,297	4	2,920	16	12	1	2,866,731	2,752		
Nevada	Newlands	463	2,106	3	20,000	14	20	2	8,917,952	8,000		
New Mexico	Carlsbad	6,063	27,481	40	136,570	84	184	6	109,115,353	57,136	129	1,290
New Mexico-Texas	Rio Grande	102	1,152	4	1,973	7	15	1	2,712,090	2,550	39	74
Oregon	Umatilla	520	1,789	4	1,300	8	14	1	2,244,152	1,750		
	Vale								(c)			
Oregon-California	Klamath	969	2,886	5	32,418	30	35	4	6,405,000	6,340	544	1,600
Oregon-Idaho	Owyhee	1,530	6,000	8	14,860	12	18	6	(c)		229	925
South Dakota	Belle Fourche	611	1,805	5	3,865	25	23	3	8,500,000	8,160		
South Dakota	Strawberry Valley	2,090	8,700	13	18,500	29	30	4	5,064,631	3,400		
Utah	Okanogan	395	1,000	3	4,920	8	8	2	23,252,240	17,544	4,386	17,490
Washington	Yakima	5,179	19,838	24	57,895	76	87	8	15,000,000	11,000		
	Kendrick	500	1,464	7	24,400	17	21	2	2,414,000	1,000	2	9
Wyoming	Riverton	1,034	1,997	3	2,768	4	19	1	2,931,196	2,200		
	Shoshone			5	3,311	3	15	1				
Total		51,790	173,063	296	674,124	803	1,153	94	425,285,974	272,002	21,633	96,947

SUPPLEMENTAL STORAGE PROJECTS		4,511	27,100	8	40,000	63	26	6	(1)	4,100	
California.....	All-American Canal.....	410	6,750	4	7,150	9	12	2	7,350,000		
	Imperial Valley.....	75	375	1	400	2	2			500	
Colorado.....	Fruitgrowers Dam.....	335	1,200	5	978	20	12	1	500,000		
	Pine River.....	811	4,302	11	8,740	21	30	3	5,902,420	7,428	
Idaho.....	Minidoka (Fremont-Madison Irrigation district).....	108	324	1	1,300	3	4	1	2,200,000	1,500	
Nevada.....	Humboldt.....	1,270	2,700	2	32,000	21	21	3	33,000,000	22,500	
	Truckee River Storage.....	40	150	1	8	4					
Oregon.....	Baker.....	118	425	8	2,500	8	4	1	491,400		
	Burnt River.....	699	2,125	3	15,500	23	32	4	5,000,000	6,000	
	Deschutes (Central Oregon Irrigation district).....	160	482	1	500	1	3				
	Stanfield.....	98	201								
Utah.....	Westland.....	518	1,530	3	3,800	5	6				
	Hyrum.....	634	2,500	10	3,700	15	23	1	1,300,000	2,500	
	Moon Lake.....	135	400	3	1,200	2	2				
	Newton.....	1,100	4,300	8	80,000	34	60	4	40,000,000	36,000	
	Ogden River.....	1,260	3,000	5	37,250	24	47	6	17,528,333	20,681	
	Provo River (Deer Creek Division).....	227	1,100	2	3,000	5	4	1	800,000	900	
	Sanpete.....	3,000	15,000	21	27,000	31	26	8	50,000,000	40,000	
	Weber.....	15,529	73,964	97	265,624	291	314	41	164,132,153	142,109	
	Total.....										
WATER CONSERVATION AND UTILIZATION PROJECTS											
Montana.....	Buffalo Rapids, Unit 1.....	141	354	2	5,125	6	14	3	6,304,161	4,772	
	Grand total.....	67,400	247,321	335	944,873	1,100	1,481	138	595,782,278	418,883	

¹ Farms furnished partial or whole water supply by Bureau-constructed works.

² Gravity division only; does not include Orchard Mesa Irrigation district.

³ Two farms in predevelopment program; 1 farm leased.

⁴ Data not reported.

REGIONAL ACTIVITIES EXPANDED

Substantial progress was made during the year toward completing the Bureau's program of decentralization and in expanding the activities of seven regional offices set up under that program. Inaugurated in September 1943 the regionalization of the Bureau is designed to coordinate activities in each of the major watersheds of the West, and to place supervision closer to the field of operations. A summary of the most important activities in each of the regions is given below:

REGION 1

Fourteen operating Bureau projects in the Pacific Northwest produced crops valued at \$178,265,000 during the crop year of 1944, and power plants operated by the Bureau delivered almost 6 billion kilowatt-hours of electric energy to war industries. This region includes the States of Washington and Idaho, all but a small portion of Oregon, part of western Montana, and small areas in Wyoming and Nevada.

The gross value of crop returns on Bureau projects in this area in 1944 exceeded 1943 by \$7,890,000 and averaged \$99.44 per acre. In addition to many other food crops, the irrigation farmers of the region raised 40,234,832 bushels of potatoes, an amount sufficient to provide a year's supply for 19 million persons; 838,517 tons of sugar beets, sufficient to provide 8 million persons with a year's supply of sugar; and 1,648,360 tons of alfalfa, which, on being fed to beef and dairy herds, provided the equivalent of an annual supply of milk for 2½ million persons plus an annual supply of beef for 2½ million persons.

In the production of power, the four Bureau multiple-purpose projects in the Northwest produced 5,894,969,245 kilowatt-hours of energy during the 1945 fiscal year. This production to a large extent made possible the huge output of aluminum and other war supplies in the area.

Largest of the power producers was Grand Coulee Dam with an output of 5,716,661,000 kilowatt-hours. There was a steady growth in this project's contribution to war industries consuming huge blocks of electrical energy, and the total output since operations were started in March 1941 amounted to approximately 15,232,375,000 kilowatt-hours by the end of the fiscal year. Although the present installation of the power plant is less than half its ultimate capacity, it continues to hold the unchallenged world's record for producing the largest quantity of hydro power in a single month: 621 million kilowatt-hours in March 1944.

Construction activities continued on a curtailed basis during the year. Work on Anderson Ranch Dam on the Boise project passed the half-way mark. On the Post Falls unit of the Rathdrum Prairie project in Idaho work was going forward on construction of a pumping

plant and discharge line. An earth dam and canals are being built on the Deschutes project in Oregon, and work was resumed under the war food program on canals and distribution system for the Yakima-Roza project in Washington.

The Northwest is mindful of this wartime food and power production record as it regards the Bureau's inventory of new projects for the postwar period and analyzes the significant features of that inventory.

Forty-seven potential developments in the States of Idaho, Oregon, Washington, and western Montana are "inventoried," and many of these would be multiple-purpose in scope. They would bring under irrigation 1,970,195 acres of new land, provide a supplemental supply to 1,552,855 acres now suffering with shortages, add 1,084,500 kilowatts of installed capacity in existing Bureau power plants, and provide 753,420 kilowatts of new firm power on projects under study.

REGION 2

An increased production of food for military and civilian needs and of electric power for war industries marked operations of Bureau projects in region 2, largest of which is the Central Valley project. The region includes three-fourths of California and a small area in Oregon. Construction was completed during the year on the 37-mile long Madera Canal to provide water for irrigating approximately 100,000 acres of land in the fertile San Joaquin Valley. The power plant at Shasta Dam, completing its first full year of operation, generated 739,000,000 kilowatt-hours of electricity to turn the wheels of California's wartime industry.

While contributing to the war program, the region also moved ahead with its plans for meeting the problems of peace. Thousands of jobs will be created and hundreds of irrigated farms made available for settlement through further development of the Central Valley project and 36 other projects included in the Bureau's postwar inventory. The first of these projects on which work will start in the immediate future is the 156-mile Friant-Kern Canal. The War Production Board approved construction of the initial 5.6-mile section in June. The canal, when completed, will extend from Millerton Lake, the reservoir created by Friant Dam, to the Kern River near Bakersfield, to provide water for irrigating 358,000 acres of new land in the highly productive San Joaquin Valley and supplemental water for an additional 374,000 acres threatened by shortages.

Millerton Lake, the reservoir created by Friant Dam, reached full capacity and overflowed the spillway of the dam for the first time on June 30. Storage capacity of the reservoir for irrigation and flood control purposes will be increased by 83,000 acre-feet with the installation of three drum gates and other control facilities on the spillway

section of the dam. Contracts for this installation are scheduled to be let early in the next fiscal year. The reservoir in 1944 provided water for irrigating 32,500 acres of land for crops and 110,000 acres for pasture land for more than 140,000 head of cattle. Water-marketing contracts were in process of negotiation with 12 irrigation districts in the San Joaquin Valley as the fiscal year drew to a close.

The Bureau has also initiated negotiations with several municipalities in the Sacramento area for a larger market for power generated at Shasta Dam. Although the plant operated at only two-fifths of its ultimate capacity during the year because the war deferred installation of full generator capacity, its output represented a saving of 1,400,000 barrels of oil which would have been consumed as fuel by steam-plant production of the same amount of power. An application was pending before WPB for the return to Shasta of two 75,000-kilowatt generators "loaned" to the Coulee Dam plant because of the war emergency. Release of water from Shasta Reservoir helped provide for irrigation needs in the Sacramento Valley, enabled farmers to double the acreage of rice, and helped protect \$14,500,000 worth of crops by controlling salt-water intrusion in the delta. Record crops were grown on the Klamath project in southern Oregon and 16,300 carloads of food were shipped.

Work was continued during the year on plans for postwar developments in the region and on preparation of comprehensive reports of projects and river basins. The Central Valley Basin report was in final stage of completion, recommending a program which would double the irrigated acreage in Central Valley through construction of 38 reservoirs for storage of 30,000,000 acre-feet of water now largely wasted. Cost of the program is estimated at \$1,800,000,000 based on 1940 prices, and benefits from such development would amount to an estimated \$275,000,000 annually. The report on Santa Barbara County investigations has been completed and is now in Washington for review. Joint investigations by the Bureau and the Corps of Engineers on the Salinas and Russian River Basins are in progress. Plans also progressed during the year for developing the recreational facilities of Millerton Lake and Shasta Reservoir, the work to be under the general direction of the National Park Service.

REGION 3

This region is the "powerhouse" without which the record production of war industries in southern California would not have been possible. From the giant power plant at Boulder Dam alone, came 6 billion kilowatt-hours of electric energy used in turning out planes and ships, in processing magnesium, and in producing other equipment and materials so vital to the war effort. From the farms irrigated by Bureau projects in this area, which embraces the State of Arizona,

southern California, and small portions of Nevada, New Mexico, and Utah, also came great quantities of food for the armed forces and the civilian population.

More than half of the electric power used by war industries in this region was produced at Bureau-operated hydroelectric plants, of which the one at Boulder Dam on the Colorado River is the largest in the world. An additional 82,500-kilowatt generator was added to the plant during the year, bringing its total capacity to 1,036,000 kilowatts. Its output of 6 billion kilowatt-hours of energy yielded a revenue of \$8,574,300. Including the power output at two smaller plants, one at Parker Dam below Boulder, the other on the Yuma project in Arizona, a total of 6½ billion kilowatt-hours of energy was produced.

Region 3 continued its substantial contribution to the Nation's war food supply. Crop production, for the calendar year 1944 from 743,018 acres served by Reclamation facilities, was valued at \$112,780,-437 and exceeded by \$3,407,259 the record production established by the region's farmers in the previous year.

On the 150,000-acre unit of the Gila project (Arizona), approved for construction, leveling operations were completed on 5,000 acres of public land in the 8,500-acre tract cleared by the War Production Board as a dust control project for the important Yuma Air Base. Over 1,300 acres are now in alfalfa and the remainder of the public land will be seeded to a sudan grass cover crop during the summer and to alfalfa in the fall of 1945. On the All-American Canal project (California), construction was progressing rapidly at the end of the year on the Coachella Canal which will bring water to 22,000 acres.

Members of the region 3 staff and other Bureau personnel have also been in charge during the past year of preconstruction surveys and the preparation of designs and specifications for the \$17,500,000 aqueduct to provide a water supply for the city of San Diego from the Colorado River.

All possible effort, with curtailed personnel, is being made in the planning of the region's 35 projects in the inventory of projects for postwar construction. Emphasis is being placed on those projects that can go forward immediately as the Nation converts from war to peace. The potential program, which would require an expenditure of upwards of \$1,000,000,000 would supplement and insure the water supply for some 600,000 acres presently irrigated but without an adequate water supply, as well as furnish water for some 800,000 acres of lands not now irrigated. In addition to the irrigation benefits, these multiple-purpose projects would add 1,885,000 kilowatts of hydroelectric capacity to the Region's power pool.

Resumption of work on Davis Dam, halted late in 1942, has been authorized by the War Production Board. This dam, 65 miles downstream from Boulder Dam, will aid in regulating the flow of the Colo-

rado River for downstream uses and provide means of compliance with the pending treaty with Mexico.

Construction work on a large scale can be resumed at short notice on the Gila and All-American Canal projects. These projects when completed and developed will provide for, roughly, 3,000 new family-size farm units. Study of the Central Arizona project, a project to divert water from the Colorado River to the highly developed irrigated agricultural area near Phoenix now sorely in need of supplemental water, is receiving priority attention. The State of Arizona is cooperating in the investigations of this project. Progress on the many other projects in the inventory will be accelerated as additional personnel and equipment become available.

REGION 4

Region 4 increased its contribution to the winning of the war while carrying on limited construction activities and speeding up postwar plans for basin-wide development of water resources. This region includes most of Utah and Nevada, that part of Wyoming and Colorado west of the Continental Divide, and small sections of Idaho, New Mexico, and Arizona.

Food for fighting men and industrial war workers was the major contribution to the war from 18 projects in operation in the region. Such operation included the storage of water in 13 Bureau reservoirs, with an aggregate capacity of nearly 1,365,000 acre-feet, in addition to the distribution and handling of other water supplies for irrigation. Approximately 494,000 acres irrigated by these projects in 1944 produced crops valued at \$35,000,000, an increase of over 50,000 acres and \$500,000 respectively during the year.

The West's big \$200,000,000 steel plant at Geneva, Utah, was furnished an increased industrial water supply from the Provo River project. The city of Ogden, Utah, threatened with a water shortage, continued to receive protection for its municipal supply from Pineview Reservoir, which, also, furnished water to war housing facilities and the Army's Bushnell Hospital in the area. The armed forces benefited from the services of 33 experienced engineers on military leave from the region. Reclamation reservoirs provided recreational opportunities for thousands of people.

Construction continued on the Mancos project, Colorado, and the Newton, Provo River, and Scofield projects, Utah. Sufficient progress had been made on the enlargement of two canals and a section of the Provo River Channel, Provo River project, to furnish a supplemental water supply of 28,000 acres of highly developed lands. A 6-mile pipeline section of the 40-mile Salt Lake Aqueduct was constructed, bringing to completion about 20 miles of the conduit that will carry water to Salt Lake City and other municipalities and in-

dustries in the area. Work was advanced on Scofield Dam and highway and railroad relocations. Work was still suspended by War Production Board stop-order on the 6-mile Duchesne Tunnel of the Provo River project, the Eden project, Wyo., and three small reservoirs of the Ogden River project.

In project planning activities, emphasis was placed on the formulation of general basin-wide plans for full utilization and control of water resources in three river basins. Preliminary reports outlining comprehensive plans for ultimate development in the Colorado River and Bonneville Basins were prepared and submitted informally for review and comment to the States and local interests concerned.

The Colorado River report, prepared in cooperation with region 3, outlines some 92 projects in the upper basin to provide 1,200,000 acres of new land with a full irrigation supply and 500,000 acres of inadequately irrigated land with a supplemental supply. Potential hydroelectric power plants are outlined with installed capacities aggregating 1,700,000 kilowatts and annual firm power generation exceeding 9 billion kilowatt-hours.

The Bonneville report describes 13 potential projects, including those that would import water from the Colorado River Basin, to bring a full irrigation supply to 350,000 acres not now irrigated and a supplemental supply to 325,000 acres insufficiently irrigated. In addition 1.2 billion kilowatt-hours of energy could be produced in hydroelectric plants, and flood control and other benefits provided. A report was well advanced on the Lahontan Basin, and detailed project investigations were being conducted and plans and estimates were being prepared for several projects in these three basins which are recommended for initial construction in the postwar period.

REGION 5

Maintenance of a high level of agricultural production on operating projects, continued construction on three war-food projects and planning for a program of postwar development marked the activities of region 5 during the current fiscal year.

The 6,534 irrigated farms in the Carlsbad and Rio Grande projects in New Mexico and Texas produced crops last year valued at \$23,205,821. The crops were grown on 174,858 acres, and the cash income averaged \$132.10 an acre. Almost 17,000,000 kilowatt-hours of hydroelectric power, with revenue amounting to \$329,447.90, were produced last year at Elephant Butte Dam on the Rio Grande project in New Mexico.

Construction in the region during the year was centered principally on the Altus, Oklahoma, and Tucumcari, New Mexico, projects, and to a minor extent on the Balmorhea and Marshall Ford Dam projects in Texas, and the Fort Sumner project in New Mexico.

Altus Dam and a major portion of the reservoir storage system, including relocation work on highways and the main canal from the dam to the project boundary, were completed. Water will be delivered to a part of the project in the fiscal year 1946.

Construction of the Tucumcari project was continued and water for the first 7,000-acre unit of project lands is scheduled for delivery early in the next fiscal year. Plans were also being made to rush construction of a 64-mile transmission line from Las Cruces to Alamogordo, New Mexico, to supply power for the Alamogordo Army Air Field and the United States Army's Ordnance proving grounds at White Sands.

Comprehensive reports on basin-wide investigations of the Rio Grande, Nueces, Guadalupe, and Colorado Rivers were completed, and the tentative drafts submitted to the Commissioner. Investigations in the Red and Arkansas River Basins were approximately 75 percent completed. Reports for the Canton and Middle Rio Grande Valley projects were in final stages of preparation, and surveys were initiated on the San Juan-Chama diversion. A power market survey in the Alamogordo, New Mexico, area was completed, two land-use programs were developed for the projects under construction, and a review was made of the land classification surveys for both projects. Approximately 600 acres were leveled on the Altus project and several thousand acres were cleared and leveled on the Tucumcari project. A demonstration farm was initiated on the Altus project.

The war has affected Bureau operations in many ways. Construction was limited to those projects considered essential under either the war food or war power program and even on such projects was carried on under severe handicaps. The increased cost of labor and materials on the two projects under construction is estimated at nearly \$11,000,000. The increased cost of project planning surveys, for salaries and wages alone, is estimated in excess of \$100,000. Serious losses, though not always tangible, were sustained on crop lands under the drive of all-out production for war. Farmers, in many instances, abandoned normal crop rotation plans in order to meet food goals, increased acreages of soil-depleting crops, were unable to carry out usual fertilizer programs because of shortages in materials, equipment, and manpower. It is estimated that crop production on the two projects under construction would have increased by \$7,000,000 had it not been for the war, and this does not include the value of livestock, poultry, and garden truck that would have been produced had the projects been completed and made productive. Also, more than a million acre-feet of water has spilled over Conchas Dam since December 1941, unused for irrigation because construction of the canal system on the Tucumcari project had to be deferred.

With the end of the war, these projects will be fully developed and many more will be completed as soon as funds, manpower, and materials are obtainable. Altogether, there are 53 projects included in the Bureau's inventory for postwar construction in region 5, which includes all of Texas and Oklahoma, most of New Mexico, the southern half of Kansas and a small area in south-central Colorado. Completion of these projects will make 11,500 irrigated farms available for settlement, irrigate 1,269,000 acres of new land, provide additional water for 991,000 acres inadequately irrigated, and make available tremendous quantities of low-cost hydroelectric power for agricultural use and industrial expansion.

REGION 6

National attention was focused during the year on the Great Plains area of the Missouri River Basin as the Bureau of Reclamation went forward with plans for undertaking after the war the largest and most ambitious development program in the 43-year history of the agency. The Congress gave its endorsement to that program by adoption of the Flood Control Act of 1944 which approved the coordinated plan of the Bureau and the Corps of Engineers, War Department, to put the Missouri and its tributaries to work in expanding the agricultural and industrial economy of a region embracing one-sixth the continental area of the United States.

The act authorized 29 projects for construction by the Bureau and authorized an appropriation of \$200,000,000 to each of the agencies for carrying out the initial phases of the program. The Bureau continued its engineering and economic investigations which have been in progress for the past several years and which culminated last year in the presentation to the Congress of a report (S. Doc. 191, 78th Cong., 2d sess.) setting forth a comprehensive program for resource development in the basin. It is contemplated that this investigation work and the preparation of detailed plans and specifications will be greatly expanded within the next few months with a view to having several projects ready for starting construction by the beginning of the next fiscal year.

To more effectively coordinate its work, the Bureau in September 1944 established a regional office at Billings, Montana, for the area made up of the States of North and South Dakota, most of Montana, and the northern part of Wyoming. This office works closely with the region 7 office at Denver, which serves the remainder of the area drained by the Missouri River and its tributaries.

Bureau-operated projects in region 6 continued their record production of food and fiber crops in helping to meet increased war demands. A total of 342,623 acres were irrigated on the eight operating projects in the region and the crops produced had a gross value of more than

\$14,000,000. This is equivalent to more than 30 percent of the total investment which the government has made in the construction of these projects.

Among the major contributions to the food supply of the Nation were 3,346,000 bushels of cereal grains, 239,000 bushels of hay, flax, pea, and vegetable seeds, 165,000 tons of hay, 1,300,000 bushels of beans, potatoes, and other truck, and 355,000 tons of sugar beets. The inventory value of all livestock on the farms of the eight projects at the close of 1944 was \$17,200,000.

Under the war food program, 14,400 acres have been brought under irrigation on the Buford-Trenton project near Williston, N. Dak., works have been almost completed for 8,000 acres in the Second Division of the Buffalo Rapids project, near Terry, Mont. Though restricted by War Production Board orders and labor shortages construction work was also in progress on the Deerfield Reservoir near Rapid City, S. Dak., a project to furnish supplemental water for irrigated lands in Rapid Valley and a municipal supply for Rapid City. Civilian Public Service camps were furnishing labor on both the Rapid Valley and Buffalo Rapids No. 2 projects.

A contract for the construction of works to irrigate 800 acres on the Intake project near Savage, Mont., was awarded and bids had been received for the Big Flat project of 900 acres near Missoula, Mont. Advertisements for bids on the 1,600-acre Dodson project, near Malta, Mont., were issued but bids had not been opened at the close of the year.

In the power field three operating plants produced a total of 141,783,000 kilowatt-hours, more than 84,000,000 of which were produced at the Fort Peck plant operated by the Corps of Engineers, and marketed through the Bureau of Reclamation.

A 115,000-kilovolt transmission line to carry energy from Fort Peck to Glendive, Mont., was under construction.

At the end of the year there were 43 regional employees in the office at Billings, Mont., and 367 employees in the field working on planning, operation and maintenance, construction and power operation.

REGION 7

With large-scale construction halted or retarded because of the war, major emphasis of the Bureau in this region was placed on continuing high level production of food and electric power and in laying the groundwork for carrying out coordinated plans for Missouri Basin development and completion of trans-mountain diversion projects. Region 7 was established 3 months after the start of the fiscal year as the newest subdivision in the Bureau's program of decentralization, and includes the State of Nebraska, northern half of Kansas, northeastern Wyoming, and western Colorado.

More than \$16,000,000 worth of war-vital crops were produced on the North Platte project (Wyoming-Nebraska), with a full water supply provided for 209,668 acres and a supplemental supply for 96,803 acres. Expanded war industries in the Rocky Mountain area made increased demands for electric power, and four Bureau-operated plants generated 185,000,000 kilowatt-hours of energy, distributed over some 900 miles of transmission lines to industry, cities, and farms.

Construction efforts were concentrated on the Colorado-Big Thompson transmountain water diversion project in northern Colorado and on the Mirage Flats irrigation project in northwestern Nebraska. Work proceeded, despite delays due to manpower and material shortages, on the lining of the 13-mile Alva B. Adams Tunnel beneath the Continental Divide, and on Shadow Mountain Dam near Grand Lake, key features of the Colorado-Big Thompson project.

Completion of the project will provide for the diversion of 310,000 acre-feet of surplus water annually from the western slope of the Rockies, through the Alva B. Adams Tunnel, for supplemental irrigation of 615,000 acres on the eastern slope and the generation of about 600,000,000 kilowatt-hours of electric energy annually. Delivery of 90,000 acre-feet of water annually is scheduled to start in the spring of 1946. Full diversion is expected to increase crop values on the eastern slope by approximately 5 million dollars annually. On the Mirage Flats project in Nebraska, construction of Box Butte Dam on the Niobrara River was about 90 percent complete and work on the irrigation canals and laterals was in an advanced stage. The dam will store water for irrigating 13,000 acres of new land to be opened for settlement by veterans and others.

Investigations were nearly complete on two other major projects proposed for postwar construction in region 7—the Gunnison-Arkansas transmountain diversion project and the Blue River-South Platte project, both in Colorado. With Missouri River waters originating in or flowing through all four states in which it functions, region 7 is also taking an active part in the plans and program for coordinated development of the Missouri Basin.

U. S. RECLAMATION INVESTMENT NEAR BILLION

At the end of the 1945 fiscal year the total investment of the Federal Government in projects constructed by the Bureau of Reclamation amounted to \$952,893,542, an increase of \$31,122,922 over the previous year.

During its 43 years of operation, accretions to the Reclamation fund have totaled \$228,106,850 (see table 4). These have come from the sale of public lands, proceeds from the Oil Leasing Act, from Federal water power licenses, potassium royalties, and rentals

and receipts from naval petroleum reserves from 1920 to 1930 under the act of May 9, 1938. Collections—construction and operation and maintenance repayments, water rentals, power revenues, etc.—have totaled \$173,263,626.

Disbursements during that period have totaled \$358,689,871, leaving a balance in the fund on June 30, 1945, of \$42,680,606. Repayments of construction charges to the Reclamation fund during the fiscal year 1945 totaled \$3,611,000. Operation and maintenance collections totaled \$1,513,000, of which \$442,000 accrued to the Reclamation fund. Receipts from water rentals, power sales, and other sources aggregated \$9,462,000.

TABLE 4.—*Accretions to Reclamation fund by States*

States	Sale of public lands		Proceeds from Oil Leasing Act		Total to June 30, 1945
	Fiscal year 1945	To June 30, 1945	Fiscal year 1945	To June 30, 1945	
Alabama.....				\$197,635.78	\$197,635.78
Arizona.....		\$2,766,339.36	\$1,792.87	9,294.47	2,775,633.83
Arkansas.....			886.47	886.47	886.47
California.....		8,304,067.54	1,790,905.22	24,986,829.16	33,290,896.70
Colorado ¹		10,326,330.20	207,288.14	1,443,771.65	11,770,101.85
Idaho.....		7,058,097.58	463.90	22,901.84	7,080,999.42
Kansas ¹		1,033,601.40	39,664.88	50,667.94	1,084,269.34
Louisiana.....			13,581.31	355,632.08	355,632.08
Michigan.....			1,323.54	2,390.35	2,390.35
Mississippi.....			122.06	232.31	232.31
Montana ¹		15,388,624.90	574,201.33	2,362,562.24	17,751,187.14
Nebraska ¹		2,097,698.70	94.50	446.25	2,098,144.95
Nevada.....		1,042,345.00	9,627.46	24,361.01	1,066,706.91
New Mexico.....		6,742,810.30	943,189.49	5,909,994.87	12,652,805.17
North Dakota ¹		12,219,646.27	25,445.46	303,496.45	12,523,142.72
Oklahoma.....		5,931,145.58	4,854.09	13,181.16	5,944,326.74
Oregon.....		11,995,324.73	894.46	1,950.04	11,997,274.77
South Dakota ¹		7,733,675.48	5,277.20	30,103.27	7,763,778.75
Utah.....		4,397,539.48	197,009.23	1,491,678.72	5,889,218.20
Washington ¹		7,475,102.22	845.12	46,116.08	7,521,218.30
Wyoming.....		8,722,080.55	2,918,225.30	44,740,980.73	53,463,061.28
Total.....		113,234,430.19	6,735,892.09	81,995,112.87	195,229,543.06
Proceeds, Federal water power licenses.....					996,812.85
Proceeds, potassium royalties and rentals.....					2,102,194.34
Receipts from naval petroleum reserves, 1920-38, act of May 9, 1938.....					29,778,300.23
Grand total.....		113,234,430.19	6,735,892.09	81,995,112.87	228,106,850.48

¹ Missouri Basin States.

² Proceeds for fiscal year \$36,221.99.

³ Proceeds for fiscal year \$124,430.38.

STATUS OF RECLAMATION FUND

Accretions to the fund:

Sales of public lands.....	\$113,234,430.19
Royalties and rentals under Mineral Leasing Act.....	81,995,112.87
Federal water power licenses.....	996,812.85
Potassium royalties and rentals.....	2,102,194.34
Receipts from naval petroleum reserves, 1920-38, act of May 9, 1938.....	29,778,300.23
Total accretions.....	228,106,850.48

NEW LAWS ADVANCE RECLAMATION

Legislation of far-reaching significance to Reclamation was enacted by the Congress during the past year. Most important was the passage of the Flood Control Act of 1944 (58 Stat. 887; Pub. Law 534, 78th Cong.) signed by the President December 22. This act:

1. Approved the coordinated plan of the Bureau of Reclamation and the Corps of Engineers, War Department, for development of the Missouri River Basin as set forth in Senate Documents No. 191 and 247, Seventy-eighth Congress, Second session.

2. Authorized appropriations of \$200,000,000 to each of these agencies for partial accomplishment of the works to be undertaken under the general comprehensive plan.

3. Established the principle that "the use, in connection with the operation and maintenance of such works for navigation herein or hereafter authorized for construction, of waters arising west of the Ninety-seventh meridian shall be subordinate to and shall not adversely affect at any time the beneficial consumptive use, west of the ninety-seventh meridian, of such waters for domestic, irrigation, mining or industrial purposes."

4. Provided that the use of irrigation water stored in reservoirs constructed by the Corps of Engineers, War Department, shall be in accordance with Reclamation Laws.

5. Provided that electric power produced at dams constructed by the Corps of Engineers shall be marketed by the Secretary of the Interior.

6. Provided for review and recommendations by the States and other Federal agencies concerned, of the reports by the Secretary of the Interior and the Secretary of War proposing and recommending construction of projects under the provisions of the act.

Several of the policies set forth in the Flood Control Act of 1944 were subsequently restated by the Congress in passing the River and Harbor Act of March 2, 1945. (Pub. Law 14, 79th Cong., 1st sess.).

This latter bill failed of enactment by the Seventy-eighth Congress due partly to a controversy which arose over an amendment which would have exempted lands in the Bureau's Central Valley project in California from provisions of the law limiting to 160 acres the area that can be held in single ownership on Federal Reclamation projects. This amendment and other controversial issues were stricken from the bill as reintroduced, and passed, by the Seventy-ninth Congress.

Water and power users on Reclamation projects benefited by the amendment on April 19, 1945, of the Fact Finders' Act (Pub. Law 35, 79th Cong., 1st sess.). The Congress by this amendment provided that the cost of administration of the reclamation program, whether incurred by the Commissioner's office in Washington or by regional or branch offices, should not be assessed against water or power users.

Another law passed to benefit farmers on Federal Reclamation projects is the act of April 24, 1945 (Pub. Law 39, 79th Cong., 1st sess.), amending sections 4, 7, and 17 of the Reclamation Project Act of 1939. This act now extends the time within which amendatory contracts may be negotiated and within which the Secretary of the Interior may

grant deferments of construction charges. It also modifies the operation of the normal and percentage plan by putting a ceiling on the amount that can become due in any year through the operation of the plan. Finally, this act now permits minor amendments, without further reference to the Congress in amendatory contracts, which have already been authorized.

The Seventy-ninth Congress also passed an act (Pub. Law 34) consenting to the negotiation by Colorado and Kansas of a compact for the division of the waters of the Arkansas River.

Veteran settlement discussion was focused during this year on a bill (H. R. 520) introduced by Representative John R. Murdock of Arizona. This bill would "facilitate settlement of returning veterans in projects constructed, operated, and maintained by the Bureau of Reclamation." Extensive hearings were held before the House Committee on Irrigation and Reclamation and the bill was reported out by unanimous vote of the Committee with recommendation that it be enacted.

Hearings were also held on Senate bill 555, to establish a Missouri Valley Authority, and the Commissioner and other officials of the Bureau made statements on the bill before the Senate Committee on Commerce.

BUREAU WINS INTERNATIONAL RECOGNITION

The work of the Bureau of Reclamation in developing western resources has won international recognition, and its engineers have been called upon by many foreign governments for technical assistance in the planning and design of projects in other countries.

John Lucian Savage, chief designing engineer for the Bureau, returned to the United States in March from an extended tour of duty in China and the Middle East as engineering consultant to various foreign governments on their plans for postwar irrigation and power developments. In his 34 years of service with the Bureau, Mr. Savage has drawn plans for the construction of more than a billion dollars worth of dams, including the three largest concrete dams ever built—Grand Coulee, Shasta, and Boulder. He went to China at the special request of the Chinese Government, "on loan" from the Bureau to the United States State Department. While there, he made the preliminary surveys and studies for several large reclamation projects, including the huge Yangtze Gorge project for irrigation and flood control. He also spent several months in India. Mr. Savage's engineering achievements have won him many honors and this year he was awarded the John Fritz medal, one of the highest honors of the engineering profession. He retired as chief designing engineer in May but will continue to serve the Bureau in a consulting capacity.

The work of the Bureau has been recognized in many other ways. Another member of its staff, Engineer Douglas McHenry, was awarded the Telford Premium by an engineering group in Great Britain. Design and construction methods used by the Bureau have been made available to many foreign governments through technical papers, by visits of foreign engineers and public officials to Bureau projects and offices and through facilities of the Bureau training program. During the year, 38 engineers from 15 foreign countries visited the design and construction offices and several of the men remained for training. Arrangements were made during the year to train foreign engineers under the sponsorship of the Foreign Economic Administration. Nineteen engineers from China began their training with the Bureau during the summer of 1945.

The Bureau's Concrete Manual has become a recognized text on concrete. Its distribution is world-wide and two foreign countries have translated it. The manual on dams, preparation of which was begun during the fiscal year, will be a comprehensive compilation of data on dam investigation, design, construction, and operation.

DECENTRALIZED ORGANIZATION

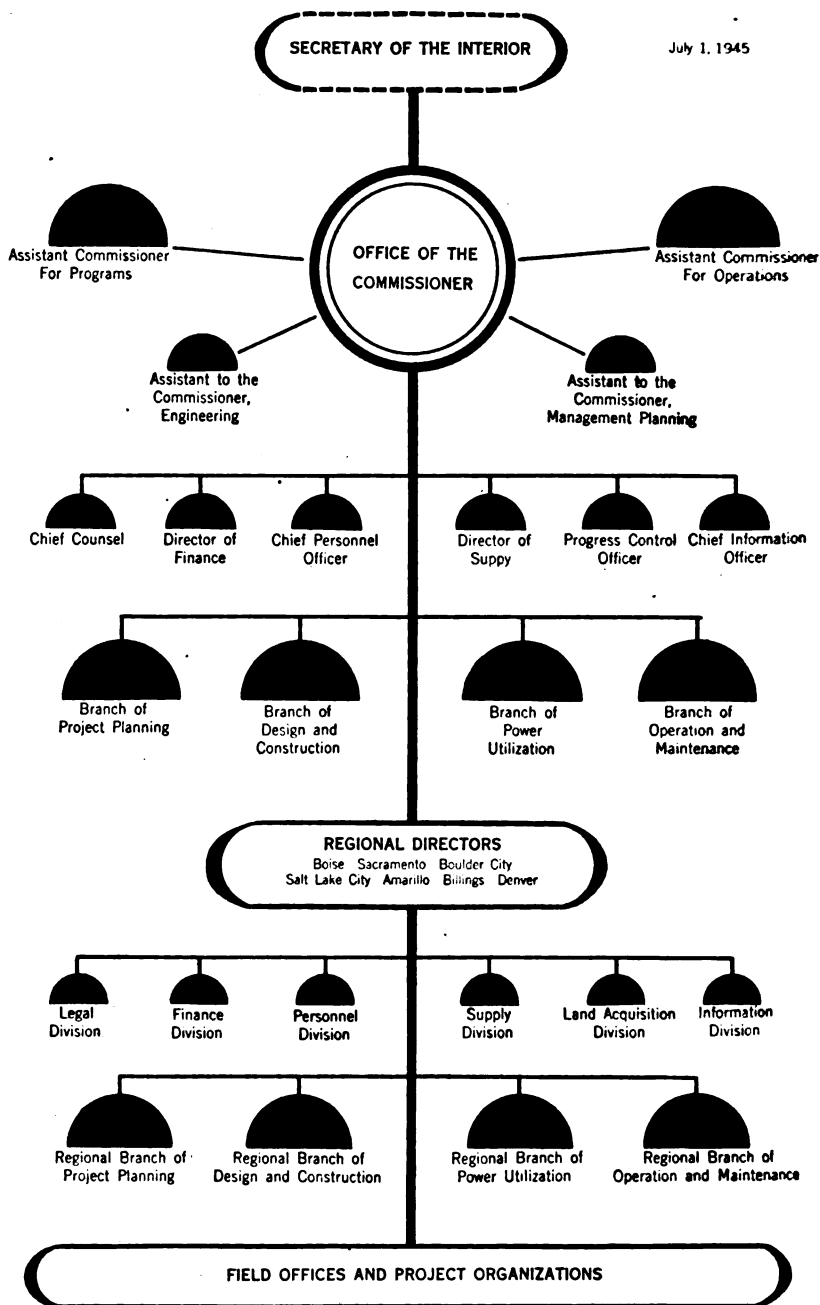
The Bureau of Reclamation, following through on a decentralization plan inaugurated in September 1943, created a seventh regional office during the fiscal year and further developed and strengthened existing staffs to expedite both war and postwar objectives.

The basic concept for streamlining the Bureau has been the establishment of competent regional organizations in each of the seven major watersheds in the 17 Western States with authority to act swiftly and surely in close collaboration with States, local interests, and other affected Government agencies.

The seven regional offices are as follows: Region 1, Boise, Idaho; region 2, Sacramento, Calif.; region 3, Boulder City, Nev.; region 4, Salt Lake City, Utah; region 5, Amarillo, Tex.; region 6, Billings, Mont., and region 7, Denver, Colo.

The regional directors who are responsible for coordinating all Bureau activities within their regions, report directly to the Commissioner of Reclamation. They are assisted in technical phases of their work by four technical branches, namely, Project Planning, Design and Construction, Operation and Maintenance, and Power Utilization, and by administrative facilities in the fields of management, law, finance, public information, supply, personnel, and office services, which are also centrally directed.

BUREAU OF RECLAMATION



The Branch of Operation and Maintenance was transferred from Denver to Washington during the fiscal year. In addition plans were made to transfer the Branch of Project Planning and the central budget function to Washington early in the fiscal year 1946.

The chart indicates the present organizational arrangement of the Bureau under the decentralization plan.

The number of Reclamation employees increased from 6,513 on June 30, 1944, to 7,033 on June 30, 1945. Further increases in the Bureau staff, greatly depleted by the war, will be required to accomplish authorized postwar programs. A total of 1,806 employees of the agency have entered the armed forces of the United States; so far, 30 have given their lives and 4 are missing.

The number of persons employed in the various Bureau activities are: Commissioner's office, 141; Branch office, Denver, 837; region 1, 1,773; region 2, 764; region 3, 1,175; region 4, 302; region 5, 1,009; region 6, 410; and region 7, 622. Ten new project and other field offices, exclusive of headquarters for project planning work, were established during the year.

PERSONNEL CHANGES

The past year has been marked by several changes in the Bureau's top-ranking personnel. Notable among these was the retirement after 34 years of Bureau service of John L. Savage, chief designing engineer, who has won world renown for his work on Grand Coulee, Shasta, Boulder, and many other dams in this country, in addition to serving as an adviser to foreign governments.

Another important change in the Denver office was the appointment of Walker R. Young, assistant chief engineer since 1940, to succeed S. O. Harper, who retired after 37 years in Reclamation. Three assistant chief engineers were appointed as follows: Chief of Civil Engineering Division, W. H. Nalder; Chief of the Electrical and Mechanical Division, L. N. McClellan; and Chief of the Construction Division, Ralph Lowry.

E. B. Debler, Director of the Branch of Project Planning, was appointed Director of the newly created region 7 with headquarters in Denver. John R. Riter, assistant Director of project planning, moved up to the position as Director of that Branch.

Goodrich W. Lineweaver, assistant to the Commissioner, was appointed Director of the reorganized Branch of Operation and Maintenance. Clifford E. Fix replaced J. Kennard Cheadle as Chief Counsel when the latter resigned to enter private practice. Barrow Lyons became Chief Information Officer.

TABLE 5.—Consolidated statement by projects of construction cost of irrigation works, other items reimbursable with construction, and deductions

State and project	Construction cost		Operation and maintenance before public notice (net)		Operation and maintenance deficits, arrears, and penalties		Construction revenues, non-reimbursable appropriations (contra)		Abandoned works, non-reimbursable cost and authorized charge-offs	Balance	
	Fiscal year 1945	To June 30, 1945	Fiscal year 1945	To June 30, 1945	Fiscal year 1945	To June 30, 1945	Fiscal year 1945	To June 30, 1945		Fiscal year 1945	To June 30, 1945
<i>Regular projects</i>											
Total.....	\$22,483,044.71	\$535,232,327.19	\$53,830.64	\$3,455,365.53	\$149,472.77	\$9,223,308.67	\$570,613.15	\$17,754,302.14	\$17,127.29	\$21,520,858.20	\$513,026,571.96
<i>Water conservation and utilization projects</i>											
Total.....	1,849,512.78	8,515,380.01	113,912.95	1,55,037.49			2,627.47	24,050.82		1,860,797.55	8,596,366.68
<i>Special projects</i>											
Colorado River Dam fund:											
All-American Canal.....	251,694.63	32,232,964.24									
Boulder Canyon.....	1,173,810.95	142,387,505.28									
Arizona:											
Davis Dam.....	197,838.11	3,499,855.77									
Parker Dam.....	2,096.29	6,821,853.10									
Parker Dam power.....	417,033.72	15,188,187.35									
Montana: Fort Peck.....	557,746.45	644,749.92									
Texas: Colorado River.....	102,544.22	23,744,940.23									
Washington: Columbia Basin	4,081,767.86	184,625,779.03									
Total.....	6,790,365.65	409,145,854.94									
Grand total.....	31,122,922.43	952,893,542.14									

• Net construction cost.

• Construction revenues.

• Operation and maintenance during construction.

Division of Power

ARTHUR GOLDSCHMIDT, *Director*



THE work of the Division of Power, which is charged with supervising and coordinating the power activities of the Department, continued along lines dictated by the marketing problems resulting from war operations, as well as by concern for postwar conversion and expansion.

The responsibilities of the Division have been greatly enlarged by the enactment of the Omnibus Flood Control and Rivers and Harbors Acts which direct the Secretary of the Interior to transmit and market all excess power generated at reservoir projects constructed by the War Department, in such manner as to encourage the most widespread use of the power at the lowest possible rates to consumers consistent with sound business principles, and to give preference in its sale to public bodies and cooperatives. In this legislation the Congress reiterated the public power policy which it has developed during the past 40 years in the Reclamation, the Tennessee Valley Authority, the Rural Electrification, the Bonneville, the Fort Peck, and other acts dealing with power. Fundamentally that policy directs that the benefits of Federal power developments shall not be monopolized by limited groups, but shall be widely distributed so that the power shall develop the industry and agriculture of the Nation, and lighten the burden of the domestic consumer.

The ultimate installed capacity of the authorized flood control projects is more than 5,775,000 kilowatts, and of the authorized rivers and harbors projects is over 1,425,000 kilowatts, or a total of more than 7,200,000 kilowatts.

The Department of the Interior is now operating and marketing power from the largest aggregate of hydroelectric capacity in the world, including power which is generated at dams operated by the United States Army Corps of Engineers.

The total investment in power facilities at projects from which the Department markets the power, including parts of dams and reservoirs allocated to power, aggregated nearly \$425,000,000 on June 30, 1944, on the basis of tentative power investment figures for those projects where the allocation studies have not been completed.

This figure also includes the Grand River Dam project which is owned by the Grand River Dam Authority of the State of Oklahoma but which since September 1, 1943, has been operated by the Department.

The generating plants from which the Department now markets power delivered 18 billion kilowatt-hours of salable energy during the 1945 fiscal year as compared with 17.6 billion kilowatt-hours the preceding fiscal year. In 1940 all of the power plants under the jurisdiction of the Department produced 3,672,995,000 kilowatt-hours. As of June 30, 1945, the total installed capacity of such plants in operation amounts to 3,107,300 kilowatts. During the 1945 fiscal year the three major power agencies of the Department, the Bonneville Power Administration, the Bureau of Reclamation, and the Southwestern Power Administration generated 17,820,000,000 kilowatt hours of which 17,300,000,000 kilowatt-hours were sold for a gross revenue of \$45,500,000.

Fortunately, hydroelectric power is not a "nonrecurring" assets. To be sure, the billions of kilowatt-hours that have gone to war in the past year are not available for nonwar or for future peacetime uses. But the power facilities and the river resources through which they were developed are long-run assets for the people of the United States to use in their national defense or in the general welfare. Against the 7,300,000,000 kilowatt-hours that were used for war purposes from the Columbia River projects, for instance, must be measured the untold millions of kilowatt-hours that were not developed during the year at proposed projects on that river system that have been authorized or studied. Unused resources, throughout the country, represent "frozen" assets that must be made useful by development. To that end the congressional authorization in the Flood Control and Rivers and Harbors Acts and the comprehensive development program of the Bureau of Reclamation will provide for a realization of a large portion of our unused hydro energy resources. But these vast new power resources must be sold and to accomplish this task efficiently studies by the power selling agencies of the Department are now under way in collaboration with other Federal agencies and with State and municipal organization. The successful efforts to develop and use the tremendous supply of public power for war activities, must, with the coming of VE-day and the anticipation of VJ-day, be matched by achievement of appropriate reconversion programs and load building activities in order to provide for the period of transition from a wartime basis to a peacetime economy without avoidable wastage of this natural resource.

The Division has also been working with the war agencies on the problem of disposition of fuel-operated generating plants that have

been built to serve some of our large military establishments and war plants. Acquisition by the Federal power agencies of those plants which will not be needed for defense purposes after the emergency, as a means of supplementing and firming the hydroelectric power which is now generated or will be generated by the proposed Federal plants, has been under study. Such coordination of Government facilities will result in better operations in areas of irregular stream flow, and consequently in sounder financial arrangements, lower rates, and greater regional benefits. In some instances such fuel-operated plants can provide needed peaking or standby power which is now being purchased by the Government.

Regional studies.—The Division has continued its participation in studies being conducted by the agencies of the Department in efforts to work out the pattern for the administration and the extension of the multipurpose developments in the various river basins throughout the country, such as the Sacramento and San Joaquin Rivers, the Columbia River, the Missouri River, the Arkansas River, the Colorado River, and the rivers in the Southeastern section of the United States. These studies are necessary to determine the best method for making available to the people of the various areas the maximum benefits of the multipurpose projects at a minimum cost. These studies include the use of power for war production, the scheduling of construction features, the reconversion of war plants in the areas, the extension of these projects to provide additional postwar opportunities, the allocation of costs, and the power policies to be effectuated.

Rates and rate schedules.—No reductions were made in the various wholesale rates of the Department during the year, but substantial reductions were made by purchasers of low-cost Department power for resale as required under their purchase contracts. Private power companies making such reductions include the Montana-Dakota Utilities Co., serving eastern Montana and western North Dakota, with a reduction of over \$200,000 per annum; the Mountain States Power Co., serving northwestern Wyoming, with a reduction of over \$25,000 per annum; The Texas Power & Light Co., serving northern and eastern Texas, with a reduction of approximately \$400,000 per annum, which includes a 10 percent reduction to Federal war loads; and the Arkansas Power & Light Co., serving much of the State of Arkansas.

Thirty-seven REA-financed projects are being supplied with power at rates ranging down to about 3 mills a kilowatt-hour. Owing to the inability to obtain materials because of war-time restrictions, no increase was made within the year in the number of Rural Electrification Administration financed projects served by the power agencies within the Department.

The Division reviewed during the year several major rate studies including the interim rate for the Central Valley project in California and the rate structure of the Bonneville Power Administration in the Pacific Northwest. In connection with the latter study which is still under consideration are proposed rates for the electrification of the railroads and the generation of steam by the use of secondary electrical energy.

Contracts.—Further efforts to decentralize the administration of power matters, while achieving maximum uniformity, has resulted in the establishment of standard contract provisions for Bureau of Reclamation projects.

Miscellaneous.—The Division participated in the negotiations for the disposal of the Hetch Hetchy power by the city of San Francisco in accordance with the terms of the Raker Act. The injunction against the sale of this power to the Pacific Gas & Electric Co. has been put into effect as a result of arrangements made by the city to use its power for its own municipal purposes and to sell power directly to two irrigation districts and to industrial war plants in the area.

The Division cooperated in studies and negotiations of the Bureau of Reclamation for the proposed acquisition of power facilities of Salt River Water Users' Association in Arizona and of the Minidoka and Burley power facilities in Idaho in an effort to bring about unified operating systems and to make possible lower rates. The Division also cooperated in the study of the financial feasibility of proposed power projects of the Bureau of Reclamation prior to authorization and in the handling of the power contracts of the Defense Plant Corporation for Boulder Dam power.

The Division was also able to render service to the Puerto Rico Water Resources Authority in connection with its priorities problems in the construction of the Caonillas Dam and transmission facilities which are necessary in the supplying of power to Army and Navy bases in Puerto Rico. Assistance was also given to the Territorial Government of the Virgin Islands in connection with the studies of critically needed AC generating and distributing systems for the towns of Charlotte Amalie, St. Thomas, and Christiansted and Fredericksted, St. Croix.

Bonneville Power Administration

PAUL J. RAVEN, *Administrator*



THE FOURTH WAR YEAR

BY June 30, 1945, the power of the Columbia River, harnessed by the two great Federal projects, Bonneville and Grand Coulee Dams, and marketed by the Bonneville Power Administration, had played a major role in the production of several billion dollars worth of ships, planes, light metals, chemicals, and other war supplies.

During the 3½ years since the United States entered the war on December 7, 1941, the Administration has delivered a total of 17.5 billion kilowatt-hours to war industries and military establishments. Revenues from the sale of this power for war purposes aggregated \$43,216,192 to June 30, 1945.

War loads continued to consume a major share of the Administration's total power deliveries during the 1945 fiscal year. Of 8.5 billion kilowatt-hours sold during that 12-month period, the Pacific Northwest's five aluminum reduction plants and one aluminum rolling mill took 4.6 billion kilowatt-hours. Although minor cut-backs in Northwest aluminum production occurred early in 1944 and more serious cut-backs threatened, the Nation's continuing high level of aircraft production made it necessary to revise estimates of aluminum requirements, and by the summer of 1945 all of the Northwest plants had been requested to increase production to capacity. In fiscal year 1945, as in 1944, the Northwest plants produced more than one-third of the Nation's entire aluminum output. Aluminum produced with Columbia River power contributed greatly toward the establishment of United States air supremacy in the European and Pacific battle areas. The 503,144,000 pounds of aluminum produced by Northwest plants in this 12-month period was sufficient to produce 10,000 B-29s or 150,000 fighter planes.

Of even greater importance to final victory in World War II was the contribution made by Bonneville-Grand Coulee power to the development of the atomic bomb. The location of the Hanford Engineer Works in the Pacific Northwest was determined to a con-

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Of even greater importance to final victory in World War II was the contribution made by Bonneville-Grand Coulee power to the development of the atomic bomb. The location of the Hanford Engineer Works in the Pacific Northwest was determined to a con-

siderable extent by the availability of large quantities of hydroelectric power and water from the Columbia River.

Working closely with representatives of the United States Army and the Hanford project, engineers of the Bonneville Power Administration conducted studies to determine: (a) The most reliable location on the Bonneville Power Administration system for the important Hanford load, (b) what system circuits and connections would be necessary so that the Bonneville generators could pick up and carry this load in case of trouble at the Coulee powerhouse, (c) how the remainder of the Bonneville system could be disconnected from the Hanford load to permit the Bonneville powerhouse or the Coulee powerhouse generators to continue carrying the Hanford load in case of major disturbances on the Bonneville system.

As a result of these studies, the Bonneville Power Administration was able to provide large quantities of power to the Hanford project with the highest possible degree of reliability, a prime requisite to successful production of the atomic bomb.

Other war materials produced during the past year in plants using Bonneville-Grand Coulee power included 181 ships—54 Victory cargo ships, 62 troopships, 63 tankers and 2 aircraft carriers—and large quantities of calcium carbide, ferroalloys; chemicals and explosives.

While the Bonneville Power Administration continued its home front job of delivering power for war, 1,050 employees on military furlough with the nation's armed forces were scattered over fighting fronts throughout the world.

CURRENT OPERATIONS

Kilowatt-hour sales of the Bonneville Power Administration for fiscal year 1945 totaled 8,502,000,000 compared with 8,671,000,000 the preceding year. Despite the slight drop in kilowatt-hours, revenues increased 10 percent from \$20,896,000 to \$22,990,000 after deduction of a \$438,560 reserve for contract and bill adjustments. This situation arises from the fact that the revenues are power billings which are based upon capacity contracted for, rather than upon energy delivered as regards the bulk of the Administration's service. For the period from the commencement of operation to June 30, 1945, earnings from power sales have aggregated \$63,626,000.

INDUSTRIAL AND RESOURCES DEVELOPMENT

As World War II drew to a close in 1945, the Bonneville Power Administration began to focus attention more sharply on the problem of developing peacetime power markets to utilize surplus power becoming available as Pacific Northwest war plants curtailed operations or closed.

Analysis of the Administration's war loads indicates that a maximum of 600,000 kilowatts, or approximately 50 percent of our total capacity may become available for remarketing.

Confronted with this possibility, the Administration is devoting considerable effort to the formulation of an extensive program of market and system development designed to provide markets for surplus power as quickly as possible, and to assist in retaining the Pacific Northwest's wartime industrial gains. The marketing program is directed toward the development of new power markets in industries that will directly or indirectly provide jobs for returning service men and displaced war workers.

REPORTS

As a part of this program, the Division of Industrial and Resources Development completed a number of reports during fiscal year 1945, based on continuing studies of Pacific Northwest resources and potential power markets.

A particularly valuable report issued during fiscal 1945 was one entitled "A Preliminary Report on the Plastics Industry as Related to Pacific Northwest Industry." This report originally had been prepared for limited distribution to technical and industrial interests. The response from industry, however, was so overwhelming that a new printing was ordered.

A new supplemental report on the same subject is now in course of preparation. It deals in specific terms with cellulose-base plastics, for the manufacture of which a great potential exists in the Pacific Northwest.

Economic surveys under the general title "Economic Base for Power Markets" were issued for the following counties: Clatsop County, Oreg., and Cowlitz, Walla Walla, and Thurston Counties in Washington. Similar surveys which were under preparation during the year and are scheduled for early release include Lane, Lincoln, and Benton Counties in Oregon; Flathead, Lake, and Sanders Counties in Montana. In Washington State, studies were under way for Chelan, Douglas, Okanogan, Clallam-Jefferson, Franklin, Benton, Skagit, Mason, Grays Harbor, Stevens, Ferry, and Pend Oreille Counties.

Reports for use within the Administration included one entitled "A Preliminary Study of Railroad Electrification in the Pacific Northwest." In brief, this study revealed the following points:

(1) In a region of great hydroelectric abundance, it seems undesirable from the standpoint of national interest to allow a continuously replaceable form of energy to remain unused while remaining irreplaceable reserves of petroleum and coal are further depleted.

(2) The development and utilization of railroad motive power is at a critical juncture, with newer forms of prime movers rapidly appear-

ing to claim the place long occupied by the old familiar reciprocating steam locomotive.

(3) The Diesel-electric locomotive, which thus far has been and gives promise of continuing to be the most likely replacement for the steam locomotive, is not a completely satisfactory answer. Neither physically nor economically does the Diesel solve all the problems which are posed by the retirement of the steam locomotive. So far as yard switching service goes, the Diesel is granted to have proved its case, and not even the most ardent advocates of electrification suggest any deviation from the trend toward their full replacement of steam units in yard and industrial trackage assignments.

(4) For main-line purposes, the problems are entirely different. Here a strong case, and it is believed an ultimately compelling one, can be made for the straight-electric locomotive.

(5) Physically, the straight-electric locomotive compares favorably with the Diesel-electric. Actually, they are both electric locomotives so far as the method by which torque is supplied to drive wheels is concerned. Where they differ is that one is supplied with electricity generated on the locomotive by a severely limited mechanism of prime mover, generator, etc., which must also carry its own fuel supply as dead weight and which has no overload capacity whatsoever, while the other can be supplied from a trolley system with an almost limitless capacity of hydroelectric central stations.

The Bonneville Power Administration, realizing that there was relatively little likelihood of adding to electrified trackage during the war, has directed its inquiries toward an appraisal of the postwar possibilities. Action has been sought on a power rate schedule that would be conducive to the consideration of electrification, and serious thought has been given to the best and most economically feasible method of bringing service from the Administration's facilities to a railroad's trolley systems. This has involved some attention to the problem of standardization of railway electrification systems which have in the past involved too many variations to lend themselves either to the most economic manufacture or operation. Studies will be continued particularly on these two subjects during the ensuing year.

Numerous other technical reports were prepared, including one on the effects of new industrial developments on tax revenues in the Pacific Northwest, and one entitled "A Review Study of the Columbia Basin" for the use of the Bureau of Reclamation. A third report dealt with shipments through the locks of Bonneville Dam. An exhaustive report was also made on the zinc lead mines of the Pacific Northwest and tributary areas.

INDUSTRIAL CONTACT ACTIVITIES

In carrying out the Bonneville Power Administration's industrial research and development programs, contacts have been made with leading industrialists and businessmen throughout the country.

Through these contacts valuable information on the Northwest's resources and market potentialities has been made available to industries in all sections of the country, many of which are looking to the Pacific coast as the last industrial frontier.

Bonneville's industrial contact program has been directed to a large extent toward the fields of electronics, electro-process industries and other industries in which low-cost power is an important element.

The region's tremendous hydroelectric power resources coupled with its rich forest, agricultural and mineral resources furnish a sound basis for the belief that the Pacific Northwest corner of the United States will play an important role in the development of new electronic, chemical, and metallurgical industries based on important discoveries made in these fields during the war.

Specific products which Bonneville research indicates can be produced in the Northwest include: phosphorus, manganese bronze, glass containers and glass blocks, sulfuric acid, industrial alcohol, electrolytic iron and other powdered metals, electrolytic zinc, rayon, pigments, dichromate salts for ink, electrolytic manganese, fertilizers, chlorine and acetylene products, tars and phenols, coal and by-products, limestone, plastic metals, lithium and other rare metals, ferro-alloys, silica sands, battery lead, and litharge.

All of these products have been discussed with industrial representatives, and it is expected that a number of new Northwest plants will be constructed in the near future as a result of these contacts.

Bonneville's industrial contact activities have been instrumental in initiating action on a number of plants already under construction or completed, including the Springfield alcohol plant near Eugene, Oreg., the alcohol plant at Bellingham, Wash., in which use is made of sulfide liquor wastes from the pulp mill in that locality. In the promotion of both of these ventures, the Bonneville Power Administration played a pioneering part.

Development of the Salem, Oreg., alumina plant was encouraged and its promotion maintained by the Bonneville Power Administration in cooperation with regional interests. Of particular interest are the electric boilers in the plant, an innovation for which Bonneville Power Administration had primary responsibility.

In electrolytic iron, the Administration stimulated the interest of three major companies, one of which is now proceeding with the selection of sites and expects to begin plant construction in the near

future. The Administration is continuing its activities in the field of powdered metallurgy now gaining in practical importance, particularly in the automotive industry. The Bonneville Power Administration also continued to stimulate interest in electrolytic manganese.

The availability of titanium-bearing sands caused the Administration actively to stimulate research in the utilization of the titanium fractions for the use of pigments. Much interest is developing in the industrial potentialities of this resource.

An important plant for the manufacture of resinous plastics for the plywood industry has been established by one of the key companies in this field. Continuous contact and release of the "Preliminary Report on the Plastics Industry" by the Administration had a direct bearing on the establishment of this plant.

Activity and interest in the production of rare metals such as lithium have been followed closely by the Administration and continuous contact with one of the major producers of rare metals indicates the possible establishment of a large plant in this region.

Culminating 8 years of effort on the part of the Administration in the utilization of electric power for the manufacture of glass was the establishment of a sizable glass-producing unit in a Northwest glass plant utilizing the so-called Cornelius electric glass furnace. The success of the operation will bear definitely on the use of this type of furnace elsewhere in the Pacific Northwest in the coming expansion of glass-producing industries.

Also as part of the interest in chemical industries, renewed activity has taken place in the mining of limestone and silicas. These two materials are the basis for any chemical industries which might develop in the Pacific Northwest.

INDUSTRIAL STUDIES

The industrial contact work indicated above requires careful advance as well as continuing industrial and market analysis. In this respect, studies on limestone and silica and on lead and zinc were prosecuted by members of the staff, together with a multitude of short-run studies required for direct industrial contacts.

The Administration continued with collaborative studies on a wood-utilization experimental pilot plant for the production of charcoal. It also collaborated in basic research work on the utilization of titanium-bearing sands for the production of pigments.

In order to lay a sound basis for market analysis, the Administration began a long-range study of interregional and intraregional freight rates as well as of specific markets for specific power-using industries. Utilization of local coals for the production of charcoal, phenol, and tars was the subject of much contact work. Discussions with leaders of industry and with Government officials on a comprehensive study

of fertilizer use and potential production in the Pacific Northwest have also been carried on in the past fiscal year. Also initiated was a long-range study of railroad electrification, with numerous collaborating contacts with the TVA, Bureau of Reclamation, and various railroads and manufacturers of equipment.

An attempt to stimulate interest in the manufacture of line hardware by local manufacturing enterprise was launched during the year, with interesting initial results.

A long-range program in the use of aluminum and its fabrication in the Pacific Northwest was initiated by the staff. The cooperative relationship of the Administration with the Office of Alien Property Custodian was continued, with many direct contacts made by the Alien Property Custodian representative.

COOPERATION WITH OTHER AGENCIES

Staff members prepared testimony and participated in hearings before the United States Senate Special Committee to Study and Survey Problems of Small Business. Particular emphasis was given to problems relating to the disposal of Government facilities in the production of aluminum and in general problems of business and industrial expansion in the Pacific Northwest States. Another committee with which the Administration collaborated was the United States Senate Committee on Centralization of Industry. Numerous conferences were held with State officials on matters relating to industrial and resource development and initial conferences were held in the four Pacific Northwest States with staff members of higher educational institutions for the purpose of developing cooperative programs of research in industry and resource utilization.

THE LIGHT METALS INDUSTRY

Much effort was put forth by the Bonneville Power Administration during the fiscal year 1945 in studying problems of industrial and peacetime operation of Government-owned light metal plants in the Pacific Northwest. Declaring it to be a primary objective of the Bonneville Power Administration to assist in the utilization of Northwest resources for the development of a well-rounded industrial economy to provide maximum employment, Administrator Paul J. Raver, in testifying before the Murray Small Business Committee, maintained that the aluminum industry can and should be a major part of that development. The following recommendations to be undertaken immediately by Government agencies to assist new operators to take over the Government-owned aluminum plants and operate them successfully were made at that time. In substance, they are:

1. In order to prevent immediate shutdown of the major part of the aluminum capacity because of a shortage of war orders, minimum

markets above immediate normal needs should be provided by Government stock-piling of aluminum ingot as a national defense measure.

2. The Government should control all surpluses of virgin and so-called secondary metal, releasing them gradually so as not to interfere with an orderly change of price levels.

3. Government should provide new operators with access to high grade, imported bauxite to insure an adequate and reliable source of raw material.

4. Government agencies should coordinate and increase efforts in the direction of assisting private enterprise to appraise both export and domestic use of light metals. The question of freight rates is basic to the aluminum marketing problem, and the Bonneville Power Administration has started studies of freight rates on electro-industry products.

5. In order to help overcome problems of improper location, fractional capacity operation and reopening of shut-down plants, the Government should provide engineering assistance in appraising production costs, grant flexible terms of lease and assume the costs of plant alterations and, where necessary, finance relocation of improperly located plants or their equipment. So far as power rates are involved in this problem, the Bonneville Power Administration has pointed out its obligation to pay for the cost of the power projects out of revenues as provided by Congress in the Bonneville Act.

UTILIZATION ACTIVITIES

Intensive efforts have been devoted throughout the year to investigation and study of electric house-heating systems, particularly installations in service for a season or more. It is immediately apparent from public interest shown in this method of home heating that a large potential market for power exists in this field. As a result of the findings of the Administration's utilization engineers in the field, many of the adverse attitudes heretofore caused by lack of knowledge of energy demands and of the cost of the electric space heating, have been dissipated.

These investigations have included extensive measurements and tests on existing heating installations to determine results and costs of this type of heating. Although a great deal of data have been accumulated, much work remains to be done in this field, particularly because of continuing new developments in electric heating methods.

In the fields of rural and agricultural utilization, considerable investigation has been made into improved methods of hay drying, fruit dehydration, sprinkler irrigation, scientific dairying, and food preservation by means of electric processes.

COOPERATIVE RESEARCH PROJECTS

As a part of the program for developing use of power in the Pacific Northwest, particularly for farm use and electric house heating, a program of cooperative research with colleges and universities in the Northwest was initiated by the Administration during fiscal year 1945.

Funds utilized for this research program were those provided by the Congress for advanced marketing activities. Agreements were executed during the fiscal year with Oregon State College, Washington State College, Montana State College, the University of Washington, and Linfield College. With each, a basic memorandum of understanding has been executed outlining the relationships between the institution and the Bonneville Power Administration and forming the basis for specific agreements regarding individual research projects.

With Oregon State College, under a basic memorandum dated May 22, 1945, eight separate studies are to be undertaken. These will include studies on (1) pipe and pipe materials for use with sprinkler irrigation, (2) dairy water heating, (3) home built farm refrigeration units, (4) electric radiant panel heating, (5) reversed cycle heating (6) electric heat storage and its economic aspects, (7) biochemical analysis dealing with preservation of forage crops, and (8) livestock feeding experiments in connection with cured hay.

Five studies will be made by Washington State College under a basic memorandum dated June 12, 1945. These will include studies on (1) cranberry drying equipment, (2) refrigeration for family use, (3) corrosion characteristics of metal pipe used in sprinkler irrigation installations, (4) low-pressure sprinkler investigation, and (5) use of electric welders on the farm and their effect on rural lines.

Under a basic memorandum dated June 23, 1945, the University of Washington will pursue the following studies: (1) Possible improvements or changes in a design of distribution systems resulting in a lower cost of distribution, (2) domestic house-heating installations in and near the city of Seattle, and (3) economics of the heat-pump method for domestic heating.

Montana State College, under a basic memorandum dated June 11, 1945, will make a survey of opportunities for small irrigation pumping plants in western Montana.

Linfield College at McMinnville, Oreg., under a basic memorandum dated June 13, 1945, will prepare a critical survey of the present art of water treatment by ozone and other technological uses of ozone.

The total maximum obligation for all of the studies to be undertaken will amount to \$63,528.

Work was started on certain of these projects during the month of June, and in other projects initial activities will not be undertaken until late in 1945. The period for completion will generally extend

into late 1946 or early 1947 although in a few instances completion by June 30, 1946, was planned.

Approximately \$20,000 has been obligated for studies relative to electric heating. Oregon State College, which has an excellent heating research laboratory, is undertaking to make experimental studies in radiant panel heating, heat storage systems and reversed cycle heating, all with electric energy as the heating medium. Radiant panel heating is perhaps the newest form of heating developed and promises to have considerable future development both because of the inherent advantages of this type of heat and because it appears to be peculiarly well adapted to conversion of existing dwellings from fuel heat to electric heat. Many problems in application of radiant panels are yet unsolved, in part relating to the characteristics of panels of different types, the method of application of panels, and the relative efficiency of panel heating.

Electric heat-storage systems have been in existence for many years and were designed originally in order to control the time of occurrence of the electrical heating load so as to prevent this from coinciding with other loads. With the development of electric heating which will probably occur, it is not likely that this "off-peak" feature will have much practical advantage, but heat-storage systems will enable the maintenance of a constant demand at all times on the electrical system to supply fluctuating heating demands. This characteristic is of great value to electrical distributors. It is hoped by the experiments at Oregon State College that it will be possible to determine the most efficient of the various types of heat storage systems now available and to simplify the designs so as to reduce the cost of installation which now is fairly heavy.

The characteristics of reversed cycle heating or the heat pump are now fairly well known, but application of this method of heating under actual operating conditions, as would be experienced in the climate of this area, are relatively unknown. Experimentation at Oregon State College will uncover the operating problems which are likely to occur and will make possible determination of the technical feasibility of this method of heating. Since the heat pump returns approximately three times as much energy in heat as is required in electricity for operation, a low-cost and practical development of this equipment would enable very rapid expansion of the electric-heating market. The University of Washington's studies in the economics of the heat pump will provide the answer to the present questions of using the equipment under conditions as they exist in the area and will also point the way to determining what reductions in costs or changes in technique are necessary to make the heat pump a practical instrument of heating.

The University of Washington will study the characteristics of existing heating installations in the Seattle area, which include a considerable variety in heating methods, such as radiant panel, heat storage, and radiant-convection. Analysis of the load characteristics and operating results will help to answer questions which occur in the minds of power distributors and ultimate consumers.

One of the major problems connected with electrical heating is the development of economical methods of distributing electricity to serve the large loads which are imposed by this use. The University of Washington will analyze the problem of the most efficient distribution methods for this type of load and the results of their studies will help in solving many problems involved.

Sprinkler irrigation is a subject of great interest to farmers in the Northwest and to the Bonneville Power Administration as a marketer of power. This method of irrigation holds many advantages for the farmers and also uses large quantities of power. Three research projects are planned to study various phases of sprinkler irrigation. Washington State College will study the corrosion characteristics of various types of metal pipe used in sprinkler-irrigation installations in order to determine relative durability of various types and the soil and water conditions to which each is best adapted. This college will also analyze various other problems involved in sprinkler-irrigation systems such as the soil and crop conditions necessary, types of sprinkler heads and other problems. Oregon State College will study pipes and pipe materials for use with sprinkler irrigation under conditions in the State of Oregon to determine which types are best adapted for furthering the efficient use of sprinkler irrigation.

Montana State College will analyze the opportunities for establishment of small irrigation-pumping units in western Montana. The detailed survey of the area which is planned will reveal the possibilities of developing irrigation projects and the conditions which must be overcome to obtain this development.

Use of electricity on the farm for operation of refrigerating units for preservation of meats, vegetables, and other farm produce promises to be a very large market for electricity in the future. It is of the utmost importance that farm refrigeration equipment be developed which will perform the job efficiently and will be relatively low in cost. Both Oregon State and Washington State Colleges have been interested in the development of farm refrigerators for many years, and each is conducting a research project on this subject with funds made available by the Bonneville Power Administration.

The interest of farmers has been much attracted in the past few years by the possibilities of improving the quantity of usable hay harvested by the use of electrically operated blowers for drying hay

in the hay mow. This practice is of particular importance in areas where there is considerable rain during hay harvesting periods. One angle which has not been sufficiently investigated to obtain reliable data is that of the nutritional qualities of barn-dried hay. It has been claimed that these are superior but this claim was not based on very thorough scientific research. Accordingly, Oregon State College proposes to expand its research program in hay drying to include investigations of the biochemical analysis of barn-dried hay in comparison with ordinary hay. They will also conduct livestock feeding experiments to throw light on the nutritional quality of barn-cured hay.

Washington State College will conduct a study of the use of electric welders on the farm which will indicate the operational characteristics of this equipment and the improvements which should be made to better adapt it to the needs of the farmers and to meet the limitations of electric power lines. This college will also conduct experiments in the development of electrically powered cranberry dryers which will make possible more efficient practices in the harvesting and marketing of cranberries.

POWER SALES

During fiscal year 1945 approximately 86 percent of all energy generated at the Bonneville-Grand Coulee plants was delivered either directly to war industries and military establishments or to other utilities to enable them to serve such loads. The proportion of total deliveries going to war loads is beginning a downward trend from the 90 percent for the 1942-43 fiscal year and 89 percent for the 1943-44 fiscal year.

The Bonneville Power Administration delivered 8½ billion kilowatt-hours of electric energy to 80 customers during this last year. Of this total, 824 million went to publicly owned utilities, 2,057 million to privately owned utilities and 5,632 million to industries and military establishments. As compared with the previous year, deliveries to other utilities increased 13 percent for publicly owned utilities and 40 percent for privately owned utilities; deliveries to industries and military establishments decreased 13 percent. The total of all deliveries under power and exchange agreements decreased 1.8 percent from the comparable figure of the year before.

Noncoincidental maximum demands under power contracts for publicly and privately owned utilities are shown in detail by customers in the accompanying table. Energy deliveries and dates of initial service are also shown by customers.

TABLE 1.—Contracts with customers not served by the Bonneville Power Administration as of June 30, 1945

	Contract demand	Date of execution
Public or peoples' utility districts:	<i>Kilowatts</i>	
Central Lincoln PUD.....	(1)	Feb. 25, 1942
Columbia River PUD.....	(1)	Dec. 18, 1942
Nehalem Basin PUD.....	(1)	July 9, 1942
Northern Wasco County PUD.....	4,000	Oct. 28, 1940
Okanogan County PUD ¹	2,500	Nov. 8, 1944
Sievens County PUD.....	(1)	Oct. 8, 1943
Tillamook County PUD.....	2,000	May 15, 1940
Union County PUD.....	(1)	Mar. 2, 1942
Whatcom County PUD No. 1.....	16,500	May 15, 1942
Cooperatives:		
Blachly-Lane County Cooperative.....	50	Oct. 7, 1941
Coos Electric Cooperative.....	(1)	Feb. 29, 1944
Irrigation districts: Vera irrigation district.....	500	Apr. 4, 1944
Industries: DPC—Salem Alumina ²	(1)	June 30, 1945

¹ No contract demand specified.
² Executed in fiscal year 1945.

TABLE 2.—Energy deliveries to customers of the Bonneville Power Administration, fiscal year ending June 30, 1945

Customers	Noncoincidental maximum demand during year	Energy deliveries for year	Date of initial service
Deliveries under power contracts:			
Public agencies:			
Municipalities:	<i>Kilowatts</i>	<i>Kilowatts</i>	
Canby, Oreg.....	435	1,725,000	Feb. 1940
Cascade Locks, Oreg.....	366	1,438,800	Mar. 1939
Centralia, Wash.....	300	60,000	Jan. 1941
Drain, Oreg.....	220	724,000	Apr. 1941
Ellensburg, Wash.....	2,502	4,046,400	May 1941
Forest Grove, Oreg.....	1,440	5,907,200	Dec. 1939
Grand Coulee, Wash.:			
Grand Coulee.....	600	2,352,600	Jan. 1942
Delano.....	140	484,800	Oct. 1942
McMinnville, Oreg.....	3,660	16,127,000	Oct. 1940
Monmouth, Oreg.....	388	1,638,400	Dec. 1940
Total municipalities.....	10,051	34,504,200	
Public utility districts:			
Clark County PUD:			
Air reduction.....	1,260	7,582,000	Aug. 1942
Dormitory.....	1,300	7,085,000	Sept. 1942
Mill plain.....	13,752	64,242,000	Aug. 1942
Clatskanie PUD.....		396,720	Mar. 1943
Cowlitz County PUD.....	15,673	109,790,825	Aug. 1941
Grant County PUD:			
Soap Lake.....	282	1,262,000	Aug. 1942
Coulee City.....	120	520,717	Do.
Grays Harbor County PUD.....	12,400	55,554,000	Nov. 1940
Kittitas County PUD.....	210	810,600	June 1941
Klickitat County PUD.....	186	633,030	Nov. 1940
Lewis County PUD.....	690	2,501,400	May 1941
Pacific County PUD:			
Raymond.....	2,450	10,396,465	Oct. 1940
Naselle.....	1,269	5,394,600	Nov. 1940
Skamania County PUD:			
Stevenson.....	588	2,451,600	Jan. 1940
White Salmon.....	436	1,043,280	Apr. 1942
Bonneville Dam.....	25	14,300	Jan. 1943
Wahkiakum County PUD:			
Cathlamet.....	678	2,762,666	Nov. 1940
Svenson.....	134	558,049	Do.
Total PUDs.....	51,453	272,999,252	

TABLE 2.—Energy deliveries to customers of the Bonneville Power Administration, fiscal year ending June 30, 1945—Continued

Customers	Noncoincidental maximum demand during year	Energy deliveries for year	Date of initial service
Deliveries under power contracts—Continued			
Cooperatives:	<i>Kilowatts</i>	<i>Kilowatts</i>	
Benton-Lincoln Electric Cooperative.....	651	2,566,800	Oct. 1940
Benton Rural Electric Association:			
Prosser.....	366	1,563,600	July 1942
Grand View.....	390	1,526,400	Do.
Big Bend Electric Cooperative.....	508	1,816,630	Aug. 1942
Clearwater Valley Light & Power.....	960	3,894,200	Do.
Columbia County REA.....	414	1,812,900	July 1941
Douglas Electric Cooperative:			
Oakland.....	533	2,056,694	Do.
Brockway Junction.....	172	595,600	Sept. 1941
Idaho County Light & Power Cooperative.....	205	735,600	Aug. 1942
Inland Empire REA:			
Colfax.....	1,290	5,361,200	Do.
Opportunity.....	1,060	4,291,900	Do.
Kootenai County REA:			
Coeur d'Alene.....	525	1,951,800	Do.
Harrison Flats.....	38	110,110	Do.
Lincoln Electric Cooperative:			
Davenport.....	343	1,222,470	Apr. 1942
Almira.....	389	1,561,824	Do.
Nehalem Valley Electric Cooperative.....	86	288,120	Feb. 1941
Nespelem Valley Electric Cooperative.....	216	788,400	Sept. 1941
Northern Idaho RERA.....	370	1,246,608	May 1943
Okanogan County REA.....	144	559,920	Aug. 1942
Pend Oreille Electric Cooperative.....	207	636,228	May 1943
Salem Electric.....	768	3,117,120	Mar. 1941
Stevens County Electric Cooperative:			
Addy.....	235	862,920	Aug. 1942
Evans.....	392	1,439,180	Do.
Umatilla Electric Cooperative:			
Substation.....	433	1,784,166	July 1942
Depot.....	816	3,866,828	Feb. 1943
Wasco Electric Cooperative.....	204	776,700	May 1941
Total cooperatives.....	11,715	46,433,916	
Total public agencies.....	73,219	353,937,368	
Privately owned utilities:			
Mountain States Power Co.....	1,200	2,403,000	Aug. 1943
Pacific Power & Light Co.....	2,475	20,215,538	June 1941
Portland General Electric Co.....	185,000	962,621,000	Dec. 1939
Puget Sound Power & Light Co.....	164,000	657,830,000	Oct. 1943
Washington-Pacific-Northwestern.....	135,000	296,280,000	
Total private utilities.....	487,675	1,959,349,538	
Military establishments, 14.....	38,379	162,652,802	
Industries, 18.....	833,907	5,469,451,566	
Total under power contracts.....	1,433,180	7,945,391,274	
Deliveries under exchange agreements:			
Publicly owned:			
Centralia.....		128,000	
Eugene.....		6,135,000	
Seattle.....		148,959,000	
Tacoma.....		314,658,000	
Total.....		469,880,000	
Privately owned:			
Pacific Power & Light.....		22,568,462	
Washington-Pacific systems.....		74,285,433	
Total.....		97,853,895	
Total exchange.....		567,733,895	
Total of energy sales under power contracts and exchange.....		8,513,125,169	

PUBLIC DISTRIBUTION

At the end of the fiscal year the Bonneville Power Administration had signed contracts with 54 publicly owned utilities and cooperatives. During the fiscal year, a contract with one publicly owned utility had been canceled and another had been added, leaving at the end of the fiscal year the same number of contracts with publicly owned utilities as were in existence at the end of the previous fiscal year.

Of the 54, all but 12 of the publicly owned utilities are now taking power, either under power or exchange contracts. Deliveries to the 42 publicly owned utilities for the fiscal year amounted to 823,817,368 kilowatt-hours, an increase of 13 percent over the previous fiscal year. During this fiscal year, 504,384,200 kilowatt-hours were delivered to municipalities which is an increase of 6 percent over the previous fiscal year. The deliveries to public utility districts amounted to 272,999,252 kilowatt-hours and is an increase of 27 percent over the previous year. The cooperatives received 46,433,916 kilowatt-hours of energy, an increase of 23 percent over the previous year.

The noncoincidental maximum demand during the year for these publicly owned utilities was 73,219 kilowatts.

The public agencies distributed low-priced Bonneville power under the best American business tradition of delivering it at the lowest possible cost to the ultimate consumers.

For the calendar year 1944, the 38 publicly owned distributors—omitting Centralia, Eugene, Seattle and Tacoma—received a gross income of \$4,802,889; and after deducting the cost of power, other operating expenses, depreciation, taxes and interest, had a net income of \$761,044. The net income amounts to approximately 16 percent of the gross revenue and included in the deductions from the revenue are taxes amounting to \$203,374.

These 38 public agencies had cash on hand or invested in United States bonds amounting to \$3,024,777, which exceeds slightly the accumulated surplus of \$3,013,845. The cash on hand of \$3,024,777 is 14½ percent of the total long-term debts of these distributors. The cash on hand also amounts to 63 percent of the gross annual revenue. This financial showing by the public distributors leaves no doubt as to the financial soundness of these distributors and the ability to distribute power to the ultimate consumers at the lowest possible cost.

Data for the cities of Centralia, Eugene, Seattle, and Tacoma have been omitted from this tabulation for they have distributed power for many years; Tacoma—for more than 50 years. These are well-established and they received during the past fiscal year only a small part of their energy requirements from the Administration.

SYSTEM POWER RESOURCES

No new generators were added to the system during the fiscal year ending June 1945; however, the generating capacity was sufficient so that by careful scheduling of outages, each of the 18 main units at the Bonneville and Grand Coulee plants could be shut down for annual overhaul and maintenance.

Although the total load on the Bonneville-Grand Coulee system was slightly less than that of the previous year due to cutbacks in war production, increased deliveries to the utilities of the Northwest power pool largely offset the decrease in industrial load.

With stream flows in the Northwest below normal during the summer and fall of 1944, the Administration delivered large blocks of power to other utilities in the region to enable them to meet their load requirements without burning critical fuel oil for power production. By the last week in December, all storage reservoirs west of the Cascade Mountains had been pulled down to their rule curves, or below, and schedules for power from the Administration and other pool utilities were suddenly increased to an all time high. As a result of these high deliveries to the pool, the Bonneville-Coulee system established a record 60-minute peak generation of 1,427,000 kilowatts on January 4, 1945. During the hour of this peak, 623,000 kilowatts were delivered to pool members for their own use. Moderate weather and heavy rains beginning the second week in January and continuing intermittently throughout the winter and spring, relieved the Northwest water shortage and consequently decreased Bonneville Power Administration deliveries to other pool members.

The flow of the Columbia River was below average practically all year, and was below the minimum on record for part of the time. Nevertheless, the power resources of the Bonneville Power Administration were adequate to meet all demands for energy.

During 1945, as in 1944, the Bonneville and Grand Coulee power plants supplied approximately 50 percent of all electric energy consumed in the five Northwest States of Washington, Oregon, Idaho, Montana, and Utah. The task of scheduling loads and regulating the frequency of the entire power pool was carried by the Administration throughout the year, with the actual regulation being done at either the Bonneville or Grand Coulee power plants, depending mainly on water conditions.

The following tabulation of energy receipts and deliveries shows the Administration's major contribution to the Northwest power pool during the past fiscal year. Deliveries to other utilities for their own use increased from 1,810,602,507 kilowatt-hours in fiscal year 1944, to 2,401,859,000 kilowatt-hours or 32.65 percent.

TABLE 3.—Bonneville-Grand Coulee generation (kilowatt-hours)

	Fiscal year 1944	Fiscal year 1945
Bonneville plant.....	3,488,873,992	3,391,127,400
Grand Coulee plant.....	5,760,949,460	5,660,446,000
Total.....	9,239,823,452	9,051,573,400

Power pool operations—scheduled exchange (kilowatt-hours)

Agency ¹	Scheduled to BPA	Scheduled from BPA	
		For own use	Other
Puget Sound Power & Light Co.....	5,152,000	657,830,000	25,857,000
Tacoma City Light.....	189,619,000	314,658,000	203,032,000
Seattle City Light.....		148,959,000	
Washington-Pacific-Northwestern systems.....		297,791,000	191,685,000
Portland General Electric Co.....		982,621,000	16,901,000
Total.....	194,771,000	2,401,859,000	437,475,000

¹ The other members of the Northwest power pool—power systems in Utah, Montana, and Idaho—are not directly interconnected with the Bonneville-Grand Coulee system.

In order to meet the power requirements of other Northwest utilities, several new points of interconnection were established during the year. The first, a temporary tie with the Portland General Electric Co., made at Bonneville's St. Johns substation on July 9, 1944, to relieve overload conditions, was discontinued on November 15 when the company's two underwater cables across the Willamette River were ripped out by a ship's anchor. Failure of these cables resulted in serious curtailment of power to a part of the company's system, but fortunately it was possible to bring into service on the same day a new interconnection with the company, tapping the Administration's St. Johns-Oregon City lines near the Linnton district of Portland.

To further increase deliveries of the Administration's power into the Portland area, one Bonneville generator was isolated to feed power directly into the Northwestern Electric Co.'s system through a temporary interconnection with the Bonneville-Alcoa No. 6 line. This tie was still in service at the end of the fiscal year, pending installation of a permanent interconnection at the Troutdale substation.

A cable failure on the Puget Sound Power & Light Co.'s system between Richmond Beach and President Point occurred on October 25, 1944, and in order to supplement the reduced capacity of the remaining cables and to assure an adequate supply of power on the Olympic peninsula, it was necessary to close the Bonneville Power Administration-Tacoma-Puget Sound Power & Light Co. loop at Bremerton. Except for normal operating outages, this loop has been closed continually since that date.

During the year, stream flow gages were installed on the Columbia River at Trinidad, Umatilla, and Celilo; and on the Snake River at Clarkston and Five Mile Rapids. These gages consist of impulse transmitters and telephone connections to the dispatcher's office, enabling the load dispatchers to obtain immediate water flow data from the various points and to make maximum use of the available water.

CONSTRUCTION PROGRESS

Although shortage of materials, lack of adequate manpower, changes in design and other factors brought about by war conditions handicapped construction progress during the year, the major projects under construction were held close to original schedules.

The most important construction project of the year—the Covington-Grand Coulee Line No. 2—was completed on October 6, 1944, approximately 1 month ahead of schedule. Energization of this line eliminated a serious transmission bottleneck in the Seattle area and reduced the load on the Grand Coulee-Covington Line No. 1 to normal or below. Prior to completion of the second line, Line No. 1 had been carrying up to 251,000 kilowatts, an overload of 41,000 kilowatts, to meet power requirements in the Puget Sound area.

The major construction projects started during the fiscal year were the Columbia substation, a new 230,000-volt substation near Rock Island on the Columbia River, and a 51-mile 230,000-volt steel tower line from Midway substation to the new Columbia substation. Completion of the Midway-Columbia project will improve stability of the Bonneville-Grand Coulee System and increase the amount of energy that can be transmitted to the Puget Sound and Portland areas.

A total of 149.8 circuit miles of transmission lines of all types was built during the past fiscal year. Segregated by voltage classifications, this construction included 146.6 circuit miles of 230-kilovolt line, 11.9 circuit miles of 115-kilovolt line, and 1.3 circuit miles of low-voltage line.

Six permanent transformer banks, one single-phase transformer and four cooling fan installations, totaling 181,600 kilovolt-amperes; and two spare transformers totaling 25,000 kilovolt-amperes were installed at various substations. However, only 132,100 kilovolt-amperes was energized and placed in service. The remaining unenergized transformers, totaling 49,500 kilovolt-amperes are available for service to the customers when required. Three permanent transformer banks and one single-phase transformer totaling 38,712 kilovolt-amperes were removed from service, leaving a net increase of 142,888 kilovolt-amperes of transformer capacity installed and ready for service during the 1945 fiscal year.

The following tabulation shows, by comparison with fiscal year 1944, system additions placed in service during fiscal year 1945:

TABLE 4.—System additions

	Circuit miles			Total
	230 kilo-volts	115 kilo-volts	Under 115 kilovolts	
Transmission lines:				
Placed in operation during 1945 fiscal year.....	183.0	25.2	2.3	210.5
In operation on June 30, 1944.....	1,055.0	1,102.5	361.0	2,518.5
Leased to other utilities.....			-10.6	-10.6
Transferred to substation plant account.....		-2	-2	-4
Operated for U. S. Army-Hanford-Taunton.....		8.5		8.5
Total circuit miles in operation on June 30, 1945..	1,238.0	1,136.0	352.5	2,726.5
	Installed at end of fiscal year 1944	Fiscal year 1945		Installed at end of fiscal year 1945
		Added	Removed	
Substation facilities:				
Transformation (kilovolt-amperes).....	2,207,079	181,600	38,712	2,349,967
Static condensers (kilovolt-amperes).....	31,390	27,720		59,110
Synchronous condensers (kilovolt-amperes).....	252,500			252,500
Substations (number).....	45	1	3	43
Switching stations (number).....	10	1	0	11

¹ Includes 49,500 kilovolt-amperes ready for service but not energized.

THE YEAR'S HIGHLIGHTS

LABOR-MANAGEMENT AGREEMENT

Of particular significance in the year's operations was the signing on May 2, 1945, of a labor-management agreement providing for a method of collective bargaining with hourly employees of the Bonneville Power Administration in the trades and crafts unions. This basic agreement was made applicable to all Bonneville hourly employees in the trades and crafts who are not subject to the Classification Act of 1923.

By the terms of the agreement, conference and consultative machinery and procedures, through the processes of collective bargaining, were set up (1) to provide for joint determination of fair and reasonable rates of pay, hours and working conditions; (2) to insure the making of appointments and promotions on a merit basis; (3) to promote stability of employment and to establish satisfactory tenure; (4) to provide for improvement and betterment programs designed to aid the employees in achieving their acknowledged and recognized objectives; (5) to promote the highest degree of efficiency and responsibility in the performance of the work and the accomplishment of the public purposes of the Bonneville Power Administration; (6) to adjust promptly all disputes, whether related to matters covered by the agreement or otherwise; (7) to promote systematic labor-management cooperation

between the Administration and its employees; and (8) to aid the reestablishment in civilian life of returning veterans.

COLUMBIA BASIN COST ALLOCATION REPORT

An earlier event of signal importance to smooth peacetime conversion in the Northwest was the completion and approval by the Secretary of the Interior on January 31, 1945, of the Columbia Basin Project Cost Allocation Report which was prepared jointly by the Bonneville Power Administration and the Bureau of Reclamation. The report was transmitted to Congress on May 8, 1945, and published as House Document No. 172.

According to the report, total estimated cost for the completed Grand Coulee project is \$487,030,228. This includes the total ultimate development of power generating capacity of 1,800,000 kilowatts of power and the completion of irrigation canals and facilities for the irrigation of 1,029,000 acres of arid land in central Washington. The project will provide a livelihood for about a quarter of a million additional people on farms or in industry and service in the project area and for many others in industry and service elsewhere in the Pacific Northwest.

Repayments from power revenues will include \$348,065,228, or 70 percent of the total project cost, from commercial power sales by the Bonneville Power Administration and \$50,500,000 for pumping power supplied by the Bureau of Reclamation to irrigate the project.

Of the remaining investment, farmers who irrigate the 1,029,000 acres of new agricultural land in the project will repay \$87,465,000, or an average capital cost of \$85 per acre for their water.

Under the terms of the report, the Federal Government will be repaid all its reimbursable investment in the Columbia Basin project within 75 years, and during that period the project will be maintained out of power revenues so that it will be in excellent operating condition after the capital cost is repaid.

The report states that existing rates of the Bonneville Power Administration are expected to produce revenues sufficient to return the power investment with interest, and to repay all irrigation and other reimbursable costs of the projects which cannot be repaid otherwise, as well as meeting all estimated obligations in connection with the Bonneville-Grand Coulee transmission system.

Commercial power revenues also will be used to establish a special treasury fund amounting to \$70,786,815 over the repayment period. This money will be available for possible reduction in water and power rates at Grand Coulee, or for assistance to other irrigation and power projects in the Columbia River Basin.

BONNEVILLE DAM PROJECT COST ALLOCATION REPORT

On June 26, 1945, the Federal Power Commission entered an order making a final allocation of the capital costs of the Bonneville Dam project incurred to June 30, 1944, including interest during construction at the rate of 2.5 percent per annum. The order fixed the total cost at \$83,709,430, of which \$5,784,055 was incurred for facilities solely for improvement of navigation; \$37,681,648 for facilities solely for development of power; and \$40,243,726 for facilities having joint value for the production of electric energy and other purposes.

The Commission allocated to power \$20,121,800, or 50 percent of the investment in joint purpose facilities. This sum plus the direct power facilities of \$37,681,648 makes a total power investment at Bonneville Dam of \$57,803,448 as of June 30, 1944.

Supplemental allocations will be made by the Federal Power Commission to include costs incurred subsequent to June 30, 1944, in completing the Bonneville project.

With actual plant investment and operating cost data now available for both the Grand Coulee and Bonneville projects, the Bonneville Power Administration is having an independent commercial audit made covering cost accounts of the Administration and the two generating projects. Upon completion of the audit a comprehensive financial report will be prepared covering the operations and financial status of the entire Federal power development on the Columbia River.

BONNEVILLE REGIONAL ADVISORY COUNCIL

Contributions of great value to the development of the Administration's programs were made by the Bonneville Regional Advisory Council during fiscal 1945. Representative leaders in business, industry, agriculture, education, government, and the press have served either as active members or invited guests at the various meetings of the Council in conferring with the Administrator on matters of moment concerning regional policies and the Bonneville developmental program.

Of particular interest in the activities of the Council was the adoption of a report prepared by an independent committee regarding the question of a coordinated river development program.

Other matters of importance studied and reported upon at Council meetings throughout the year included rural electrification, relation of freight rates to industrial development, electric house heating, power rates for industry and for irrigation, the Administration's advanced marketing program, the transmission construction program and problems involved in developing a coordinated research program for the region.

Southwestern Power Administration

DOUGLAS G. WRIGHT, *Administrator*



THE Southwestern Power Administration was created by order of the Secretary of the Interior on August 31, 1943, for the purpose of fulfilling the requirements of the Executive Orders 9366 and 9373 which provide for unified administrative control during the war of (a) the operation of the Grand River Dam project and the marketing of the power generated by the project, (b) the marketing of power generated by the Norfolk Dam project, operated by the United States Army Engineers, and (c) the marketing of the power generated by the Denison Dam project, also operated by the United States Army Engineers. The Southwestern Power Administration assumed these duties on September 1, 1943, with the present Administrator appointed as Acting Administrator.

The Flood Control Act of December 1944 vested in the Secretary of the Interior the responsibility for distributing and marketing the power output of the multiple-purpose reservoir projects authorized by the Congress for construction by the War Department. The Southwestern Power Administration has made a general study covering all of the constructed, authorized, and proposed War Department projects on the Arkansas, White, Ouachita, Red, Brazos, Neches, and Guadalupe Rivers.

PRESENT ACTIVITIES

GRAND RIVER DAM PROJECT

The Grand River Dam project was constructed by the Grand River Dam Authority, an agency of the State of Oklahoma, under a Public Works Administration loan and grant agreement. Construction was started in 1938 and the plant began commercial operation May 1, 1941. Of the total \$25,113,636 estimated cost of the project, \$11,113,636 was supplied by the Federal Government as a grant and \$14,000,000 as a loan which is to be repaid by the Grand River Dam Authority from revenues of the project. The initial installation was four 15,000 kilowatt generating units. Space was provided in the power plant for two additional identical units. The fifth unit was

purchased in 1941 by the Grand River Dam Authority, but priority ratings were not high enough to enable the manufacturers to proceed. Late in 1944, adequate priority assistance was granted, and installation of the unit will be completed by the end of 1945. The plant capacity will then be 75,000 kilowatts.

With the power supply for war production becoming critical in 1941, the President on November 21 assumed control of the project on behalf of the United States under section 16 of the Federal Power Act and designated the Administrator of the Federal Works Agency to operate the project and dispose of the power generated.

Contracts were negotiated for the sale of power to war industries. Forty-thousand kilowatts of the capacity were committed to the Ark-La Electric Cooperative, Inc., for transmission to the Defense Plant Corporation's aluminum plant at Jones Mills, Ark. Other war loads served are Camp Gruber near Muskogee, Okla.; the Oklahoma Ordnance Works near Pryor, Okla., and the Cardox Corporation at Claremore, Okla.

On September 1, 1943, control of the project was transferred to the Secretary of the Interior. With the end of the war approaching, negotiations have been started to return the control of the project to the State of Oklahoma.

During the period of Federal control, from November 21, 1941, through June 30, 1945, the gross revenue has been \$5,499,110.

NORFORK DAM PROJECT

On July 30, 1943, the President under Executive Order 9366 assigned to the Secretary of the Interior the responsibility of marketing the power and energy generated at the Norfolk Dam project in Arkansas, which is a combined flood control and hydroelectric development on the North Fork of the White River. This project was constructed and is operated by the United States Army Engineer Corps. The project was built with an initial installation of one 35,000 kilowatt generating unit and provision for three additional units. The cost of the Norfolk Dam project is approximately \$26,000,000.

The project was operated on an emergency basis while it was under construction to meet a critical power shortage in the Southwest during the last 6 months of 1944 and until March 6, 1945, when commercial operation was begun with a full reservoir. Revenues from the sale of power amounted to \$321,593 through June 30, 1945.

DENISON DAM PROJECT

The Denison Dam project was built and is operated by the United States Engineer Corps. It is located on the main stem of the Red

River between Texas and Oklahoma near Denison, Tex., and Durant, Okla.

The Denison Dam project, like the Norfolk Dam project, is a combined hydroelectric and flood control development. The cost of the project is approximately \$54,000,000. The initial installation consists of one 35,000 kilowatt generating unit, and provision for four additional units.

The project was operated on an emergency basis, like Norfolk, during the last 6 months of 1944 and until March 9, 1945, when commercial operation began. Revenues from the sale of power amounted to \$313,892 through June 30, 1945.

MARKETING POLICIES

The Grand River Dam project has its own transmission system which enables it to serve its customers directly and without relying on the facilities of others. Interchange agreements with the Public Service Co. of Oklahoma and the Oklahoma Gas & Electric Co. provide stand-by and off-peak steam-generated power and energy. Project sales for the fiscal year ended June 30, 1945, were 453,180,939 kilowatt-hours. During the war nearly all of the power has been delivered to war industries. A program of encouraging peacetime industries to locate in the area served by the project has been forwarded for 2 years, with the result that service to The B. F. Goodrich Co. at Miami, Okla., began in December 1944, and construction is under way to bring Grand River Dam power to the lead and zinc fields of northeastern Oklahoma. Introduction of low-cost power into the field will result in prolonging its life for probably 20 years, in the opinion of the major companies which operate in the area.

The Norfolk Dam and Denison Dam projects, on the other hand, do not have adequate transmission systems; it has, therefore, been necessary to sell the entire output of the projects to the neighboring private utility companies, Arkansas Power & Light Co., Texas Power & Light Co., and Oklahoma Gas & Electric Co., for the duration of the war. The contracts provide for a reduction in rates to power users of \$400,000 per year by the Texas Power & Light Co., and \$150,000 per year by the Arkansas Power & Light Co., with the additional provision that rates to the rural cooperatives served by the two companies shall not exceed 6 mills per kilowatt-hour for the duration of the agreement.

Under the 1944 Flood Control Act, the Secretary of the Interior is assigned the duty of marketing the power and energy generated at all dams built and operated by the War Department to Federal agencies, public bodies and cooperatives, and private companies in that order of preference, and is authorized to construct or acquire the necessary transmission lines and related facilities. Accordingly,

plans are now being made to interconnect the projects and carry out the directive of the act.

COORDINATED OPERATION

Coordination of operations between the three projects has been impossible during the war because the Government does not own the necessary interconnecting transmission lines, and some of the private companies, whose lines do not interconnect the projects, have been unwilling to make agreements for the interchange of power and mutual use of facilities. The Flood Control Act of 1944 enables the Secretary to accomplish the desired coordination by interconnecting the projects. Engineering studies show that by coordinated operation of the eight presently constructed or authorized projects in this area, the combined dependable output can be increased by 10 percent both in power and energy over the sum of their individual capabilities.

POSTWAR PLANS

The Flood Control Act of 1944 has made it necessary for the Southwestern Power Administration to plan an extensive program of transmission line construction for interconnecting hydroelectric projects in the Southwest and marketing their output. The conclusions and recommendations are included in a report to the Secretary entitled "Report on Comprehensive Plan of Power Distribution and Sales from Hydroelectric Projects as Authorized by the Flood Control Act, December 1944 (H. R. 4485) in the Southwestern Region—Arkansas, Oklahoma, Texas, Louisiana, southeastern Kansas, southern Missouri." It will be necessary to secure an average revenue of approximately 5 mills per kilowatt-hour for the wholesale power and energy delivered to consumers from the integrated system. The conclusions of the report are as follows:

1. The hydroelectric developments at the reservoir projects, under control of the War Department, must be fully integrated with each other, with existing utility system, and sufficient fuel burning generation to firm up their entire capacity to realize the full benefits of the power installations.
2. Adequate transmission and distribution facilities must be made available either by utilizing existing facilities or the construction of new facilities to bring the power from the interconnected hydroelectric developments to the load centers of the area, and to prospective users of the electric service if the most widespread use of the electric power and energy at the lowest possible rates to consumers is to be secured.

Bureau of Mines

R. R. SAYERS, *Director*



FOREWORD

THE prodigious effort of the mineral industries of the Nation to provide the raw materials for the weapons and munitions of war was supported throughout the fiscal year by the manifold activities of the Bureau of Mines. As the demand for mineral commodities of all kinds increased, the Bureau intensified its work of exploring mineral deposits and developing methods of treating ores, its investigations of fuel resources, its production of helium, its research on explosives, and its many other varied technologic and economic services to the extractive industries.

To help meet the needs for minerals from domestic sources, the Bureau conducted 150 exploratory projects and examined 850 additional ore deposits in 36 States and Alaska. The critical and essential minerals, such as tungsten, vanadium, chromium, zircon, coking coal, fluorspar, mica, asbestos, optical calcite, and crystalline quartz, received special attention. Lead and zinc deposits were explored in a dozen States. Copper deposits were likewise extensively explored, and two major low-grade deposits were confirmed by Bureau engineers in Arizona. A low-grade mercury deposit in California, estimated to contain 10,000 flasks, was disclosed by diamond drilling. Exploratory projects on pegmatites in 6 States stimulated production of strategic mica. Through continuation of the large-scale exploration of bauxite deposits in Arkansas and Alabama, approximately 90,000,000 tons of bauxite of all grades were added to the known reserves. The search for needed nonmetallic minerals was conducted in 12 widely scattered States. In the course of hundreds of such projects, new useful techniques were developed for diamond drilling, bulldozer trenching, and geophysical exploration.

In connection with the Bureau's investigations of mining methods, a method of tamping blast holes was devised which has lowered dynamite consumption 25 percent at mines adopting it, and a new micro-seismic method of determining rock pressure was further developed.

At its metallurgical experiment stations, demonstration plants, and

pilot plants, the Bureau of Mines developed and improved methods and processes for using mineral resources unsuited to ordinary treatments. Substantial progress toward this end was made with manganese from extensive low-grade reserves, and full-scale tests at steel plants assured an adequate market for an electrolytic manganese plant large enough to produce low-cost metal. Advances were made in processes for treating Montana chromite, Idaho cobalt, Alabama iron, South Carolina sillimanite, North Carolina feldspar, and the domestic and foreign fluorspar stock-piled by Metals Reserve Company. Numerous iron, copper, lead, and zinc ores were tested by ore-dressing methods, and experimental studies were continued on smelting iron-chromium-nickel ores of Oregon and Washington, leaching Wyoming vanadiferous phosphate shales, producing titanium and zirconium metals, reducing magnesium, and extracting alumina from low-grade bauxites, clays, and alunite.

Three ferro-alloy pilot plants, an electrolytic chromium pilot plant, and a bauxite mill were completed, and "breaking-in" operations progressed at a methane-reduction zinc pilot plant.

With fuel shortages still prevalent, the Bureau of Mines acted as consultant to industry, Government, and home owners on problems of efficient storage, selection, and utilization of coal and coal products. Fuel-efficiency and equipment-acceptance tests, together with a national fuel-conservation program, saved thousands of tons of coal. Anticorrosion studies and a feed-water-conditioning service helped protect 300 million dollars worth of boilers and lines at Federal and other plants. New sources of coal were explored in critical-shortage areas, and thousands of samples of coal, coke, peat, briquets, pitch, tar, coal dust, and organic compounds were analyzed. To aid anthracite producers, the Bureau studied mine-flood prevention, suggested methods for more efficient mining, and developed new uses for surplus anthracite fines. Completion and successful testing of a large gasification retort brought cheap, abundant lignite nearer integrated industrial usage.

Wartime demands having cut sharply into known petroleum reserves, the Bureau stressed research on methods of recovering more oil from old fields and increasing the use of crudes held undesirable by refiners because of their sulfur content. With the major effort centered on condensate fields which produce petroleum suitable for blending or "building" special aviation fuels, seven reports were published on stimulative production methods. The results of these and other studies were submitted to operating companies and Government agencies concerned with meeting the war needs for special lubricants, fuels, and chemicals.

Looking still farther ahead to the day when auxiliary sources of oil and gasoline may be needed to fuel the motorized economy, the

Bureau was well on its way toward the development of synthetic liquid fuels. With Congressional authorization, construction started on a laboratory at Bruceton, Pa., for research on the hydrogenation and gas synthesis processes of producing oil from coal, on a laboratory at Laramie, Wyo., to develop oil-shale distillation processes, and on a demonstration plant at Rifle, Colo., to provide for private industry a technical and economic prospectus on the possibilities of exploiting the country's rich and immense oil-shale reserves. The Bureau engineers went abroad to obtain first-hand information on synthetic fuel operations at plants captured from the Germans. An oil-shale mine was opened in Colorado.

Production at the Bureau's five helium plants, which extract the world's supply of this useful lightweight, nonflammable gas from natural gas, continued at approximately the same rate, for commercial demand increased sharply as direct war uses declined. Helium in Federal gas fields was conserved by increasing the proportion obtained from privately produced natural gas that is being piped to commercial markets, and reserves were augmented by injecting the surplus from this source into the subterranean vaults of the Government-owned Cliffside field for storage until needed. Bureau engineers developed another new use for helium, employing it to trace the underground movements of oil and gas.

To aid industry in conserving irreplaceable equipment and experienced manpower, the Bureau intensified its safety and security programs. Accidents declined and output mounted as the coal-mining industry, demonstrating an increasing acceptance of the recommendations of the Federal inspectors, made innumerable safety improvements in the 3,400 coal mines visited during the year. Bureau engineers and safety instructors trained thousands of additional workers and officials in first-aid, mine rescue, and accident-prevention procedures. They assisted at major mine disasters and investigated mine accidents, explosions, and fires. Mine equipment and materials were tested for safety in the Bureau's laboratories, where special investigations on safe equipment design also were continued for the Navy.

Attesting to the whole-hearted cooperation of the mineral industries in the Bureau's wartime plant-security assignments, the record still was free of a single known case of sabotage when the mineral-production security program was terminated and the explosives control program was curtailed at the close of the fiscal year.

Thousands of chemical analyses and control tests were made on explosives and flammable gases, many for other Government agencies, and cooperative inspections were conducted with the Army, Navy, and State agencies on the storage of explosives. New explosives for mining and military use, and explosive devices captured from the enemy were examined; and research was continued on the ignition of

gases and dusts by explosives. New schedules were prepared governing the use of higher charges of unsheathed explosives and the testing of Diesel mine locomotives for use in the gas- and dust-laden atmospheres of coal mines. A method for determining detonator efficiency was developed, and an electronic chronoscope which measures time intervals of a millionth of a second was invented and used in Bureau and military tests on explosives.

To guide Bureau engineers and mine inspectors in preparing gas- and dust-control recommendations, some 19,000 mine-air and coal-dust samples were analyzed for explosion hazards. Advances were made in methods for determining atmospheric contaminants, and many respirators were tested for efficiency.

As the chief source of economic and statistical information on minerals, the Bureau provided the basic facts on domestic and foreign production, stocks, distribution, and consumption required by war agencies and industries to guide their programs. Toward the end of the year, these fact-finding and economic services were being revised to enable industry to meet many reconversion problems and to permit Government to determine policies in regard to potential utilization of surplus war plants, appraisal of postwar employment prospects in the mineral industries, and the use of mineral resources in proposed river-valley development projects. Facts on the causes and frequency of accidents in the mineral industries, also collected and analyzed by the Bureau, proved their worth in helping to keep accident rates within bounds under difficult war conditions.

Demands from industry, war agencies, and the public for published information continued to increase, and the Bureau prepared and issued many bulletins, technical papers, handbooks, and other reports. A large number of other reports necessarily had to be issued on a confidential basis. However, under a rigid policy of economy, the number of copies printed and distributed was held to a minimum. The shortage of paper and difficulties of printing made it necessary to delay the publication for general use of other reports. It is hoped that the accumulation of all the valuable wartime information can be published and made available during the forthcoming year to service the minerals industries and the general public in the reconversion period.

FUTURE WORK

War experience has indicated that the Nation's known reserves of many minerals are inadequate to meet peak emergency demands. This fact emphasizes the need for advance preparation to strengthen the country's domestic mineral position for any future crises. There is wide agreement that such preparation should include some provision

for national stock piles of strategic and critical materials, together with an exhaustive mineral exploration and metallurgical research program. Surplus war materials would provide the nucleus for a stock-piling program, and their storage would prevent a deflation of mineral prices that would be inevitable if they were dumped on the market.

A comprehensive inventory of the Nation's mineral resources is needed urgently. No accurate, or even reasonably correct, estimate of the location, extent, quality, and minability of the various ores in the United States and Alaska now exists. Neither are the ways and means of utilizing them fully known. Had this knowledge been available when the war began, it would have saved time, money, and possibly lives. With the passage of the Strategic Minerals Act in 1939, the Bureau of Mines was permitted to make a modest start on a mineral inventory but only a start. When the "day of infamy" occurred at Pearl Harbor, the objective necessarily was shifted to that of finding deposits that could be brought into production immediately. Time was of the essence and there was none to spare for the usual decided lag between exploration and production. Exasperating delays occurred, nevertheless, particularly where methods of mining and treating marginal deposits had not been tried out in advance, for production does not follow in all cases merely because high prices are offered for the contained metal in such deposits.

A continuing program is proposed, therefore, which will include both exploration of reserves and investigation of mining and treating methods so that marginal deposits of strategic minerals can be an effective bulwark against any future emergency. Changing projected needs for a national emergency and continually advancing technical knowledge require a long-term program subject to constant revision so that plans for the development and treatment of large strategic reserves will be the best available and ready for use at once should the need arise. The Bureau is capable and willing to undertake such an assignment.

If the mining and metallurgical processes for low-grade and complex ores were developed and made available, some marginal deposits would come into economic production before another national emergency would be likely to occur, thus contributing to the well-being of industry and the national defense. Small operators interested in such deposits require help, particularly because they are unable to retain research staffs and operate laboratories and pilot plants as large corporations do. Not only technical assistance is required, but economic advice as well, encompassing marketing studies and analyses. The Bureau will continue to render such services to the best of its ability.

The mineral industry has acquired many other problems as a result of the war. In the race against time to provide minerals for war,

much of the usual long-range development work has been deferred in existing mines. Some aid may also be required on such problems as acquiring new machinery or replacing old machinery, improving roads, and obtaining financial backing and skilled manpower. The Bureau will continue to assist as much as possible in accordance with the functions that have been delegated to it.

The national security and the national economy are closely linked in all fields, but particularly so in the mineral industry. If the Nation is to be in any sense secure, it must have a healthy, thriving mineral industry.

To insure the survival and maintenance of such a going industry, consideration must be given to its problems. Victory will abruptly wipe out the Government's war procurement programs for minerals and metals and reduce the premium prices that had been paid for some of these products. Reconversion of war plants, modernizations and repairs for railroads and other heavy industries, and long-deferred demands for consumer goods undoubtedly will take up part of the slack for several years, but domestic producers will require a permanent market and a stable price structure. Lest these be imperiled, careful consideration of the problems of international trade and the disposal of war stocks of metals and scrap will be necessary. The extractive industries must be assured of a helpful and stable national mineral policy if they are to prosper.

SUMMARY OF ACTIVITIES

EXPLORATION AND METALLURGICAL RESEARCH

As the decisive campaigns of the war opened and the demand for raw materials necessary to the manufacture of arms and munitions increased, engineers of the Bureau of Mines intensified their quest for adequate sources of metals, and metallurgists redoubled their research on methods for utilizing the vast reserves of low-grade mineral deposits. Substantial progress was made in each field.

During the fiscal year 1945, the engineers examined 850 mineral deposits and conducted exploratory projects on 150 deposits in 36 States and Alaska. Meanwhile, the metallurgists solved problems of immediate importance in supplying critically needed materials for war together with some of longer-range significance.

To the engineer in the field and the metallurgist in the laboratory, the approach differed but the objective was the same—more effective utilization of the mineral resources to the end that they might make the greatest possible contribution to the Nation's economy and security.

Criteria for Projects

In selecting deposits for exploration, restrictions upon the Bureau required that one of the following criteria apply in each case:

1. Geologic, geophysical, or engineering evidence must indicate, in the judgment of the Bureau's engineers, that the project has a possibility of making a substantial contribution to the national economy; or
2. The project must show promise of making a direct contribution to the national security, such as the possibility of producing material for Government stock pile; or
3. The project must have been specifically authorized and directed by the Congress.

Following exploration, samples from the mineral deposit were submitted to the Bureau's laboratories and pilot plants to determine whether the material could be treated commercially by known methods. If not—and this frequently is true now that the “cream-skimming” period of mineral exploitation has reached its denouement in the United States—new processes of treatment were sought. In this manner some low-grade mineral deposits become actual ore reserves.

In the course of conducting hundreds of exploratory projects, the Bureau of Mines developed several useful new exploratory techniques. In a northern iron district, glacial drift as much as 90 feet in thickness overlies important deposits of magnetite iron ore. Because of numerous boulders in this unconsolidated material, it was difficult to drill through to solid rock. A new technique was developed on the spot by the engineers. The method was to freeze the moisture in the gravel, in order to hold the boulders firm so that they could be drilled and then permit the unconsolidated material to be cored. In one case, the penetration of 90 feet of such material—formerly requiring 2 weeks—was accomplished by this method in 9 hours.

From the beginning of the exploratory program, extensive use was made of the bulldozer for trenching through overburden to expose ore bodies at considerably less cost than the older hand methods. Trenches that would have taken half a dozen men several weeks to dig with pick and shovel were excavated in a few hours by a single bulldozer operator.

By placing pressure and speed gages on hydraulic-feed diamond drills and correlating the results with the type of rock and percentage of core recovery, the Bureau hopes to improve and perfect control of drilling operations.

Geophysical exploration methods are being more widely used and useful new instruments are being perfected. For example, a sturdy, self-leveling magnetometer has been developed which is sensitive enough for most purposes and which permits set-ups to be made and readings to be taken in about half the time needed with other instruments.

As mining problems also must be solved to obtain maximum production of domestic mineral resources, the Bureau, at its Mount Weather Testing Adit, developed a method of tamping blast holes which has saved 25 percent in dynamite consumption at several operating mines where the procedure was adopted. The Bureau continued its work in developing new uses for the microseismic method of determining rock pressure. Two investigations in progress may ultimately lead to the recovery of several million tons of high-grade ore from mine pillars.

In the field of metallurgical research, the Bureau's Pacific Experiment Station at Berkeley, Calif., during the war developed fundamental data for compounds involved in processes under study at other experiment stations and pilot plants, while the Rare and Precious Metals Experiment Station at Reno, Nev., functioned primarily as an analytical laboratory serving exploration projects for war minerals.

Iron, Steel, and Ferro-alloys

Continuing its search for additional reserves of iron ore and ancillary materials required for a record steel production, the Bureau of Mines explored by drilling, trenching, or tunneling 76 deposits in 27 States and Alaska. These included 32 iron, 16 fluor spar, 10 coal, 6 manganese, 5 tungsten, 5 nickel, and 2 chromium deposits. In addition, some 450 deposits were examined by Bureau engineers.

Important reserves of iron ore aggregating many millions of tons were indicated in Arizona, Utah, Alaska, New Jersey, New York, Pennsylvania, Missouri, and Virginia. Studies made in Alabama offer promise that significant tonnages of usable ore may be recovered from the tailings of former operations.

Results of pilot-plant and cooperative investigations on manganese during the year justify the prediction that the United States may be considerably less dependent in the future upon foreign sources of this strategic metal. Tests conducted largely in cooperation with the steel industry disclosed that the electrolytic manganese produced in the Bureau's pilot plant at Boulder City, Nev., has enough applications in industry to assure an adequate market for a plant of sufficient size to attain low production costs.

The Bureau completed tests on Three Kids manganese ore from southern Nevada and made detailed estimates of capital and operating costs for a commercial plant capable of producing 40 tons of metal a day. Electrowinning campaigns also were carried out on samples of Ladd mine ore from California, carbonate nodule concentrates from Chamberlain, S. Dak., and oxide ore from the Metals Research Company stock pile at Deming, N. Mex. Development of Carra mining and conical rolls separation for the Pierre manganese shale near Chamberlain, S. Dak., on which considerable work was

done during the year, promises a substantial reduction in production costs. This development, together with the successful electrowinning campaign on nodules at Boulder City, may eventually lead to the peacetime exploitation of the South Dakota deposit, the Nation's largest manganese reserve, containing some 50 million tons of manganese in nodular form. Research continued on the production and study of alloys made with electrolytic manganese. At Salt Lake City, Utah, campaigns were carried out in the small dithionate leaching plant on manganese ores from Arizona, Nevada, and Utah.

Construction and equipment installations progressed at the new ferro-alloys pilot plants at Rolla, Mo., and Redding, Calif., while plans were completed for a similar pilot plant at Raleigh, N. C. Investigations to be made at each pilot plant will seek methods for utilizing steel and ferro-alloy raw materials occurring in the vicinity.

An electrolytic chromium pilot plant with a daily capacity of 100 pounds of metal was brought into operation at Boulder City, Nev., treating Montana chromites. At Minneapolis, Minn., agglomeration tests on mixtures of off-grade Montana chromite concentrates and Russian chromite fines yielded a satisfactory feed material for ferro-chromium furnaces. Cobalt concentrates produced at Salt Lake City from low-grade, complex, cobalt-copper-silver-gold ore of Idaho's Blackbird district were treated successfully in a 5-pound-a-day electrolytic cobalt pilot plant installed during the year at Boulder City, Nev. Small-scale smelting tests on the production of nickel-iron from iron-chromium-nickel ores of Oregon and Washington were continued at Salt Lake City, and larger-scale tests are planned at the Northwest Electrodevelopment Laboratory at Albany, Oreg. Late in the year, laboratory tests on the extraction of vanadium and phosphate from extensive deposits of Wyoming shale culminated with the installation and operation of a small pilot plant at Salt Lake City.

Beneficiation tests were made on iron ores and sponge iron products in laboratories at Salt Lake City, Utah; Rolla, Mo.; Minneapolis, Minn.; Tuscaloosa, Ala.; and College Park, Md. At Tuscaloosa, significant developments were made in the hydraulic classification and flotation of Alabama iron ores. Sponge iron produced in saggers at the Canton, Ohio, and Salisbury, N. C., pilot plants and in rotary kilns at the Laramie, Wyo., and Johnstown, Pa., pilot plants of the Bureau of Mines was used successfully in melting tests at several commercial steel and wrought-iron plants. Following laboratory tests at Salt Lake City, tonnage samples of Shasta, Calif., magnetite were magnetically separated and the high-grade concentrates were reduced at the Laramie pilot plant. It was planned to use this sponge iron in steel-making investigations at Redding, Calif. After magnetic separation tests at College Park disclosed that extremely high-grade concentrate could be made from magnetite ore occurring at Cran-

berry, N. C., a pilot mill was installed at the deposit to produce concentrates for the Salisbury sponge iron pilot plant. The highest quality sponge iron ever made in substantial amounts was obtained from these concentrates. At Minneapolis, experiments were completed on the Brassert bubble hearth-type of reduction with hydrogen and work was continued on shaft-furnace reduction of iron ore concentrates. At Salt Lake City, tests were continued on smelting and leaching methods of extracting iron and titania from the titaniferous magnetites of Iron Mountain, Wyo.

To increase supplies of critically needed acid-grade fluorspar, commercial milling of material stock-piled by the Metals Recovery Company was made possible by Bureau of Mines laboratory and pilot-plant flotation tests at College Park on Spanish fluorspar of metallurgical grade and at Rolla on similar Mexican and domestic material.

Nonferrous Minerals

In the field of the nonferrous minerals—lead, zinc, copper, tin, and the various pegmatites—the Bureau of Mines simultaneously carried on a far-reaching exploratory program, a broad research and development plan, and a major drainage project.

The exploration of 28 lead and zinc deposits in 12 States disclosed large reserves in Illinois, Idaho, Nevada, Kansas, and Oklahoma. Bureau engineers also examined 130 additional deposits during the fiscal year.

Despite shattered, caving ground and heavy inflows of water which retarded progress, the Leadville tunnel in Lake County, Colo., was advanced 4,800 feet or nearly a mile in the fiscal year 1945, bringing the total advance to 6,600 feet. This tunnel project, undertaken in the direction of the Congress, was designed to provide permanent drainage for 84 mines which have been flooded and idle since 1910. The purpose was to make available, upon its completion, an estimated 4 million tons of zinc, lead, and manganese ores, and revive the formerly productive Leadville district.

A major low-grade copper deposit was confirmed in Pima County, Ariz., and another deposit of considerable promise was delineated in Coconino County, Ariz., as the Bureau of Mines carried out 15 exploratory projects for copper in 9 States. Another 85 deposits were examined by Bureau engineers. Private interests are conducting further exploratory work on the Pima County deposit.

Meanwhile, considerable beneficiation work was done on copper, lead, and zinc at Salt Lake City, Utah; Rolla, Mo.; and College Park, Md. A pilot plant for reduction of zinc with methane gas was completed at Rolla and breaking-in operations were conducted. Cooperative investigations were continued with a commercial firm on improvements in the smelting of lead and zinc

A lode deposit of tin on the Seward Peninsula of Alaska, which has greater potentialities than any other known domestic source of tin, was tested through diamond drilling by the Bureau of Mines. Another tin deposit was explored in California.

Two mercury deposits, both in California, also were diamond-drilled by the Bureau. One of these, in Napa County, is estimated to contain 10,000 flasks of recoverable mercury sealed in low-grade ore reserves. Six other mercury deposits were examined by Bureau engineers.

Six investigations in as many States were conducted on pegmatites that yield feldspar, mica, beryl, tantalum, and lithium minerals. The principal objective of this work, which included explorations of many separate deposits, was to stimulate production of the strategic mica used in radio sets and aviation spark plugs. Forty-eight additional deposits of mica were examined. A flotation flow sheet developed several years ago in the Bureau's laboratories at College Park, Md., and Tuscaloosa, Ala., made possible the erection and successful operation of a 750-ton-a-day mill at Kona, N. C., to supply feldspar of the grade and in the amount needed.

Nonmetallic Minerals

Anticipating a major postwar demand for the commodities made from nonmetallic minerals—including building materials, insulating products, fertilizers, paints, pigments, and inorganic compounds—the Bureau of Mines explored 12 deposits in 11 widely-scattered States and Alaska. These included sillimanite, potash, optical calcite, and asbestos deposits, together with 2 barite and 6 corundum deposits.

Georgia's and South Carolina's huge deposits of sillimanite, a material used in the manufacture of refractory brick for high-temperature furnaces and spark plugs, hold promise of national self-sufficiency in this commodity, which the United States heretofore has largely imported. Mineral-dressing investigations at College Park and Tuscaloosa developed a procedure for grading sillimanite up from 20 to 98 percent purity with high recovery, and tests at the Electrotechnical Laboratory at Norris, Tenn., indicated that sillimanite concentrate can be substituted for scarce kyanite in refractory brick.

Approximately 50 deposits of nonmetallic minerals were examined by Bureau engineers. Their minerals include silica, oil shale, quartz crystals, kyanite, pearlite, pumice, talc, pyrophyllite, bentonite, and vermiculite.

Light Metals

Fortunately, the supply position of the United States improved during 1945 in the light metals—aluminum, magnesium, and their alloys. Hence, it was necessary to mine and use only a small portion of the reserves of bauxite—estimated to total 90 million tons of all

grades—indicated by large-scale exploration by the Bureau of Mines in Alabama and Arkansas.

Work continued at several laboratories and pilot plants on the extraction of alumina from low-grade bauxites, clays, and alunite, with particular emphasis on assisting in operation problems at Government-owned, semicommercial alumina plants. At Bauxite, Ark., construction of a pilot bauxite mill was completed, and breaking-in operations were started. At Rolla, Mo., laboratory beneficiation studies were made on bauxites to be treated in the mill. At College Park, Md., progress was made on the recovery of magnesium and aluminum from drosses, powders, and dust. Air tabling of magnesium sawdust recovered magnesium metal of suitable purity and particle size for reduction of titanium.

Significant advancements were made in the development of a new commercial metal, ductile titanium. This project was transferred from Salt Lake City, Utah, to Boulder City, Nev., where a production rate of approximately 100 pounds of metal a week was attained. A project was begun at the Albany, Oreg., Electrodevelopment Laboratory on the reduction of zircon, which is present in Oregon beach sands. As both titanium and zirconium are reduced with magnesium, their production might offer a post-war outlet for magnesium metal. The Albany laboratory will continue development work on the carbothermic magnesium reduction process, which had been studied at Pullman, Wash., and in cooperation with the Ford Motor Co. at Dearborn, Mich.

COAL AND COAL PRODUCTS

To combat the problem of solid fuel shortages which persisted in 1945, the Bureau of Mines promoted methods for more thorough mining of coal, improved preparation and upgrading of coal for specialized uses, and secured better utilization of coal and coal products in industrial establishments and homes.

In conjunction with its well-known fuel services, the Bureau analyzed more than 20,000 samples of various fuels during the year in its laboratories. This work helped maintain fuel efficiency at Army and Navy installations, helped keep war industries operating at full capacity, aided Federal coal-mine inspectors in preventing coal-dust explosions, guided Government fuel-purchasing agents, and assisted the coal exploration and research work of the Bureau. Maintaining its consulting service for Government agencies in the purchase and utilization of fuels and fuel-burning equipment, the Bureau saved thousands of tons of coal by recommending changes in the operation of equipment at many Army camps, eliminated difficulties that prevented continuous boiler operation at two Navy land stations, chose fuels for new Veterans' Administration projects, and

made scores of fuel-efficiency and equipment-acceptance tests. Federal boiler plants, including those at all Army posts, were safeguarded against boiler-scale corrosion and caustic embrittlement by the Bureau's feed-water conditioning service, and studies of corrosion in condensate return lines resulted in better protection for \$300,000,000 worth of steel equipment.

Thousands of volunteers were enlisted in a Nation-wide fuel efficiency program aimed at saving 29 million tons of coal a year and proportionate economies in the commercial and industrial use of other types of fuel and energy. More than 13,000 plants and establishments pledged cooperation as a network of some 20,000 engineers and fuel experts—virtually all serving without pay—carried the campaign directly to commercial, industrial, and institutional fuel consumers. Thousands of copies of publications incorporating up-to-date information on such subjects as coal storage and use were made available to industry.

Also directed at fuel-shortage problems, Bureau studies resulted in the establishment at Philadelphia of a packaged-fuel plant for converting 150,000 tons of surplus anthracite fines into a more convenient fuel and in the blending of anthracite fines with bituminous coal for stoker use.

Coal Mining and Exploration

Cooperating with anthracite producers, the Bureau studied problems of mine flood prevention and better methods of mining the thin, steeply pitching beds that constitute a large part of remaining reserves. Determinations were made on the economic limitations of light equipment for stripping coal from outcrops in mountainous areas. Coal fields of the West, South, and East were explored for minable reserves of coking coals, and the Pacific Northwest was scoured for adequate fuel supplies to relieve an acute shortage in that area. Laboratory petrographic examinations and coking tests were made on more than 150 coals of the United States, Chile, and China, and methods of increasing the production of Chilean coals were investigated.

Gas- and Dust-Explosion Research

To reduce explosion hazards in coal mines and many types of plants, tests were made on industrial powders, dust, and vapor-air mixtures. Recommendations and safety codes were formulated for plants producing explosive materials and dust, and specifications for conductive footwear and flooring materials were developed to lessen hazards of explosions from static electricity. Conditions permitting the safe use of larger charges of explosives in coal mines were determined by tests.

Coal Preparation and Storage

To augment diminishing reserves of high-rank coking coals and to up-grade marginal and lower-rank coals, studies were made on preparatory treatments to reduce sulfur and ash in coking coals and on the salvaging of refuse coal at points of origin. The distribution of sulfur in the coking coals of Greene County, Pa., was determined, and concentrating tables were found effective for recovering coke breeze from dumps. Two Alabama companies based designs for coal-preparation plants on washability data provided by the Bureau. Laboratory studies were made on the storage properties of about 35 coals.

Coal Combustion

Keeping pace with new developments in order to improve its service to industry, the Bureau of Mines became the first in the United States to employ the electron microscope for determining the surface area and size distribution of powdered coal. Needed information was provided on the burning characteristics of war-emergency fuels, including some produced by new processes. The Bureau developed apparatus to measure the thermal conductivity of coal-ash slags, permitting the study of slag deposits on boiler tubes from melted coal ash to provide the data required for improving the design and operating efficiency of boiler furnaces. Fundamental data were obtained in a study of more than 200 ash analyses, and studies of slagging and atmospheric conditions around furnace walls demonstrated one cause of tube failure and lessened boiler "outage," or time lost in maintenance and repairs.

Coking and Gasification Studies

Progress was made on two processes which offer promise of a cheap source of materials for a multitude of purposes. In the first, carbon monoxide of relatively high purity was produced by burning pitch coke or petroleum coke with oxygen. In the second, the Nation's immense reserves of lignite were brought closer to industrial use through the successful testing of a large retort for producing carbon monoxide and hydrogen from lignite by gasification. Evaluation of the gas- and coke-making properties of coals from newly developed fields greatly benefitted the coke and gas industries. Greater production and a more uniform grade product were obtained without increased capital or labor costs at several coke plants using the Bureau's data on coal bulk-density control, and others receiving direct technical assistance also reported higher operating efficiencies and increased outputs.

Synthetic Liquid Fuels

Major strides were made in the fiscal year 1945 toward the objectives set forth by the Congress in the Synthetic Liquid Fuels Act

(Public Law 290), which commissioned the Bureau of Mines to undertake a 5-year, \$30,000,000 research and development program to demonstrate and to provide private industry with the "know how" for making synthetic fuels from American coals and oil shales.

With sites chosen and construction under way at the end of the year on three of the four major installations required, research also was in progress in temporary laboratories. Buildings were being erected and equipment installed for a coal research and development laboratory at Bruceton, Pa., an oil-shale demonstration plant near Rifle, Colo., and an oil-shale research and development laboratory at Laramie, Wyo. The announcement of the location of the fourth and final installation—a demonstration plant for the production of oil and gasoline from coal by the hydrogenation and gas synthesis processes—was expected shortly, for detailed information already had been collected and analyzed on 206 proposed sites, in 21 States, including several war plants suitable for conversion. This demonstration plant, which will produce 200 barrels of oil a day by each process compared to 1 to 2 barrels a day from the preliminary pilot plants, will be designed to incorporate new German developments and ideas obtained in a study made during the year of captured documents and synthetic fuel plants.

At nearby Pittsburgh, a staff of more than 100 persons who will operate the Bruceton, Pa., laboratory is now engaged in fundamental research, process development, and engineering design. Progress has been made in developing an internally cooled converter designed to reduce the steel requirements for each production unit to one-fifth or even one-tenth of that required in the present European equipment. The effects of variables such as catalyst, temperature, and contact time on the primary liquefaction of coal by hydrogenation have been studied, and the experimental hydrogenation unit has been operated in a Bureau-developed process for the production of fuel oil from coal.

At Laramie, Wyo., research also was conducted in temporary quarters to obtain fundamental data needed for the design of experimental and demonstration plants for producing marketable products from oil shale. Among the investigations begun was the so-called thermal solution method in which the oil shale is heated to moderate temperatures (400° C.) in the presence of a solvent such as shale oil and then extracted with a more volatile solvent.

At Rifle, Colo., construction on the demonstration plant, roads, utilities, and housing was in progress at the close of the fiscal year. The processing section of the plant was designed to have retorts of several types, handling 25 to 100 tons of shale each per day, as well as equipment for refining the shale oil to produce salable products. A mine was opened which will provide up to 200 tons of shale

daily for the retorts, develop low-cost methods of mining oil shale, and demonstrate the costs of mining on a large scale.

PETROLEUM AND NATURAL GAS

To offset in some measure the immense withdrawals from the Nation's oil reserves during the war, the Bureau of Mines has stressed a three-phase program of conservation and better utilization, the objectives being to increase primary recovery of oil through more efficient utilization of the energy impounded with the oil in the native reservoir, to stimulate secondary recovery of oil from old fields, and to enhance the use of crude oils containing sulfur compounds which the refiners regard as undesirable. Unaltered by the weakening of enemy resistance, these are basic, long-range objectives in the field of petroleum and natural gas, and the Bureau's research toward their attainment will be continued.

In 1945, studies of primary methods of crude-oil extraction were intensified in the California, Rocky Mountain, and Gulf Coast fields with particular emphasis upon the gas-condensate reservoirs of the latter region. Engineering analyses of reservoir data were made for the operators and Government agencies concerned with three gas-condensate fields, each with multiple-zone production. Flow characteristics and other properties of the fluids from two of the reservoirs were determined on the spot in a specially designed mobile pilot plant, and fluids from the third reservoir were collected for subsequent laboratory analysis. In a study of reservoir conditions in Naval Petroleum Reserve No. 1 at Elk Hills, Calif., the Bureau performed service for the Navy and unit operators by analyzing more than 600 samples of unconsolidated cores and by determining gas-liberation and shrinkage data as well as other physical characteristics of the reservoir oils.

In Oklahoma's West Edmond field, a technique of diamond coring was introduced which has wide application in other fields where the use of steel bits causes low core recoveries.

The internal corrosion of tubing and wellhead equipment in fields where high pressures and temperatures exist has become a serious menace to life and property. Laboratory corrosion tests conducted by the Bureau under controlled conditions simulating those found in field practice indicated the probable corrosive effects of carbon dioxide and organic acids and disclosed the protective values of different chemical inhibitors.

Extending their research on stimulative methods of secondary recovery in fields long past their peak of production, Bureau engineers prepared reports on such operations in Illinois and the Appalachian region and on the history of water-flooding operations in Kansas. New techniques were developed in the water and core

laboratories which aided greatly in the interpretation of field data. Contamination of oil-field cores by "oil-base" muds was studied intensively. A pilot-plant process yielding a 90-percent recovery of microcrystalline wax distillate from tank-bottom settlements was developed successfully after many technical operating difficulties were overcome.

Wartime petroleum chemistry and refining research of the Bureau of Mines—involving superfractionation, hydrocarbon analysis, and engine testing of fuels—was channeled toward the maximum utilization of the less desirable domestic crude oils in aviation and other fuels. To this end, a comprehensive investigation was undertaken upon sulfur-bearing oils. Postwar developments will demand increased knowledge of the composition of petroleum, and the Bureau's wartime studies of aviation fuels will form the groundwork for research programs to obtain accurate information on the hydrocarbon composition and properties of distillates from all types of crude oils. During the year, 32 special restricted reports containing some 600 pages upon several phases of the aviation-fuel work were made available to refiners and members of technical committees. Many of these data will be applicable to postwar refining of aviation, motor, and Diesel fuels.

Precise values of certain fundamental thermodynamic constants were determined on 11 different pure hydrocarbons, heats of combustion were ascertained on blended fuels proposed for use in the latest types of aviation engines, and preliminary work was done on lead tetra-ethyl. The completion of a hydrogen liquefaction plant permitted the extension of low-temperature research to 435° below zero Fahrenheit).

HELIUM

Direct war uses of helium—a lightweight, nonflammable gas produced solely by the Bureau of Mines—declined somewhat in 1945, but commercial demand increased some 65 percent and other war-supporting uses also increased, permitting production to continue at approximately the same rate as last year.

The Bureau's helium plant at Otis, Kans., was awarded the Army and Navy "E" for outstanding production, and the plants at Amarillo and Exell, Tex., each received a star for their Army and Navy "E" ratings.

To conserve helium for future use, the Bureau established a gigantic underground cache by injecting all produced in excess of military and industrial needs into the Government-owned Cliffside gas field. This helium was extracted from natural gas being delivered by private producers to domestic and commercial markets and otherwise would have been lost. Helium in Government-owned fields also was con-

served by increasing the proportion taken from privately owned natural gas.

Now used as a tracer gas in underground oil and gas reservoirs to determine flow conditions, helium has provided the petroleum industry with a new and important tool. Bureau engineers introduced this technique in the Elk Hills Naval Petroleum Reserve with signal success. Many other industrial applications of helium have been developed to supplement its principal employment in the inflation of lighter-than-air craft. The Bureau of Mines, with its present facilities, stands ready to meet the demand occasioned by these and by other new uses still in the development stage.

EXPLOSIVES RESEARCH

Fostering the protection of life and property, the Bureau of Mines made many special investigations for industry and the armed forces on the safe manufacture and handling of explosives and explosive materials. In the course of these studies, the Bureau's technicians made more than 400 chemical analyses, 2,700 gallery tests, and 2,000 other control tests.

Research on the explosive properties of important combustible liquids and gases, such as high-octane gasoline and materials for synthetic rubber, enabled the Bureau to develop methods for preventing explosions. Inert atmospheres, for example, were used in loading incendiary war materials.

An investigation of the numerous acetylene generator explosions in shipyards, which was undertaken at the request of the War Production Board, disclosed that inferior carbide and improper generator operation caused a number of these disasters.

Following an extensive investigation of a disastrous fire which broke out when a storage tank containing liquefied natural gas failed at Cleveland, Ohio, on October 20, 1944, the Bureau of Mines prepared detailed recommendations for preventing the recurrence of such disasters.

To avoid fires and explosions caused by sparks and arcs from bare electric trolley wires in gassy and dusty coal mines, the Bureau encouraged the development of Diesel mine locomotives by preparing a schedule of permissible requirements for such locomotives.

To assist mines in meeting increased demands for coal, the Bureau determined the conditions under which the permissible charge of explosives may be increased from 1.5 to 3 pounds. A new schedule also was published which set forth the conditions under which permissible blasting devices can be fired without stemming. Sheathed explosives reduce or prevent fires and explosions caused by blasting in coal mines, but sheaths may increase toxic gas emissions under certain conditions and these are being studied. Hazards associated with the use of liquid-oxygen explosives also were being evaluated.

New equipment for testing explosives and detonators was intervals including an electronic chronoscope that will measure time invented, of a millionth of a second. Five more explosives were added to the list of permissible explosives, which now includes 178.

Cooperating with the War and Navy Departments, the Bureau determined experimentally hazards involved in the handling and storage of military explosives and incendiary materials, and a member of the Bureau's staff served as chairman of the Army-Navy-Bureau of Mines Board on the Storage of Smokeless Powder. A related study is in progress on the hazards associated with static sparks.

SAFETY, PLANT PROTECTION, AND HEALTH ACTIVITIES

An acute need for increasing war production in the mineral industries despite manpower and equipment shortages lent added significance to the safety and security programs of the Bureau of Mines in the fiscal year 1945.

Under these programs, the Bureau performed a multiplicity of services—virtually all devoted basically to the conservation of essential manpower and equipment in these industries. These services included safety education, accident-prevention training, accident investigations, material and equipment tests, coal-mine inspections and reports, prevention of sabotage with the cooperation of the armed forces, explosives control, and field and laboratory studies on the occurrence of gases, dust, temperatures, and other conditions affecting the health of mine workers.

The influence of the Bureau's safety programs upon the accident records of the mineral industries cannot be measured with exactitude, but it is significant that coal-mine fatality rates declined to the lowest point in the Nation's history.

Fewer American mine workers lost their lives for each million tons of coal produced in 1944 than in any other year on record. Despite numerous unfavorable safety factors incident to a war economy, including the necessity for producing a maximum quantity of coal, between 150 and 200 lives were saved in coal mines as compared with the previous year. The fatality rate for the first 6 months of 1945 likewise shows a heavy reduction over the same period in 1944. In fact, nearly 4,000 coal miners are alive today who might have perished during the last 3½ war years had coal-mine fatality rates remained at the levels of World War I.

Safety Work

The safety educational and investigative field work of the Bureau of Mines, an invaluable service to industry for more than 3 decades, is correlated and directed by the supervising engineers of the eight districts into which the country has been divided. These men,

veterans of many years experience in industrial safety work, also administered coal-mine inspection, explosives control, and mineral-production security activities within their respective districts.

During the fiscal year 1945, the Bureau's safety engineers and instructors trained more than 18,000 employees of mining and allied industries in first-aid and mine rescue procedures, increasing to more than 1,600,000 the total number of persons given these courses since the establishment of the Bureau in 1910. These men also assisted in conducting 22 first-aid contests in five States. About 1,200 workers and officials in the mineral industries completed Bureau courses in accident prevention, and approximately the same number received partial training.

In this safety-education program, the Bureau utilized extensively motion pictures, slides, demonstrations, and similar visual educational methods. Sound motion pictures were exhibited 231 times at safety meetings, and Bureau representatives attended and addressed 494 safety meetings in 29 States.

At virtually all major mine disasters occurring during the year, Bureau personnel assisted in the rescue and recovery operations which usually are arduous and dangerous in character. The aid thus rendered often enabled the mines concerned to resume production at relatively earlier dates. In all, Bureau engineers investigated 31 mine explosions in 31 States, 52 mine fires in 20 States, and 132 miscellaneous accidents in 30 States.

Following investigations in which 1,327 explosion tests were made, the Bureau gave its official sanction and approval to 26 units of electrical equipment designed for safe operation in gassy mines. Special investigations were continued on the design of safety equipment for naval use.

Had such services as first-aid and mine rescue instruction, accident-prevention training, accident investigation, disaster recovery work, equipment tests, and safety research been available from private sources, it is estimated that they would have cost the mineral industries considerably more than \$1,000,000 during the year. Such services could not be provided, however, by any means other than a similar national organization.

Coal-Mine Inspection

In the fiscal year 1945, Bureau of Mines representatives made 3,163 inspections and reports on coal mines producing approximately 91 percent of the Nation's total annual output. The reports on these safety surveys, most of which were reinspections, demonstrated an increasing acceptance of the Federal safety recommendations by the coal-mining industry, for hundreds of proposed improvements had been made in the mines since the previous inspections.

Virtually all of the mines in the United States employing 25 or more men now have been inspected at least once, and many have been examined several times. Greater attention was given last year to mines employing fewer than 25 men, more than 100 such mines being inspected. In accordance with an order from the Secretary of the Interior on July 1, 1944, the Bureau of Mines assumed responsibility for safety inspections of mining operations on the public domain, Indian lands, and other Government-lease operations formerly inspected by the Geological Survey. Many of these are small mines which ordinarily would not be inspected by the Bureau.

Federal coal-mine inspection has a definite dollar value to the industry, for accident reductions actually attained resulted in a money saving to the industry, considerably in excess of the hypothetical cost estimates.

Fatal and nonfatal accidents in the Nation's coal mines were reduced approximately 11 percent in 1944 as compared with 1943. On the usual basis for computing direct and indirect accident costs, this reduction represents a saving of upward of \$6,000,000 to the industry. Unquestionably the mines of the country are in a much safer condition today than they were before the advent of the Federal inspection program, and this program has been a large factor in bringing this condition about. The program also has influenced some States to modify their mining laws to parallel in part the Bureau's inspection standards.

Antisabotage

When activities under the mineral-production security program of the Bureau of Mines were ended officially on June 30, 1945, the World War II record of the Nation's mineral industries remained unblemished by a single known case of sabotage. In the absence of any subversive acts—and even a few might have seriously crippled the war program—it obviously is difficult to assess the extent to which the Bureau's activities are responsible for their prevention, but is believed to be appreciable. Cooperating closely with the Internal Security Division of the Office of the Provost Marshal General, the Bureau's engineers made surveys during the year at 36 facilities not formerly inspected, thus increasing to 2,911 the total number of mines, mills, smelters, and refineries inspected during the life of this program. Recurring inspections made at intervals of 90 days at the more important facilities totaled 395 for the year, or a total of 1,598 reinspections during the past 3 years.

Security inspections at coal mines were discontinued at the end of June 1944, permitting the reduction of field engineers engaged in this work to 16. The defeat of Germany made further curtailments possible, and the working agreement between the Bureau of Mines and the War Department was terminated in May 1945.

Explosives Regulation

At the direction of the Congress, the Bureau of Mines maintained close surveillance over the millions of pounds of nonmilitary explosives used during the year by American industries to make certain that none fell into subversive hands.

The Federal Explosives Act was administered through an organization of some 3,900 cooperating licensing agents serving without pay, at least 1 being designated in nearly every county of the United States for the convenience of applicants. In the fiscal year 1945, approximately 90,000 licenses were issued to individuals and firms requiring explosives, which increased the total number of licenses approved during the war to about 760,000, including reissuances.

Since the work was undertaken, the Bureau has found it necessary to revoke only 56 licenses, indicating that compliance has been obtained with a minimum of interference with business and industry. Most of the violations resulted from ignorance of the Federal requirements, and 14 of the revoked licenses have been restored upon request and assurances by the licensees that they would in the future comply with the act and regulations.

During the year, Bureau investigators inspected or reinspected more than 16,000 explosives magazines and submitted reports on each to the Washington office. In consequence, more than 7,500 letters of instruction or recommendation on safe practices were transmitted to licensees, and the replies indicated that 5,188 explosives magazines were improved to comply with minimum standards of construction and locking to minimize thefts.

Explosives control funds were reduced substantially at the end of the war, and early termination of this work was anticipated.

Health Work

Two broad objectives in the Bureau's over-all program—accident prevention and better working conditions in the mineral industries—were furthered materially by the analysis of numerous gas and dust samples, improvement of procedures for determining atmospheric contaminants, inspections of unhygienic conditions with recommendations for control measures, approval testing of respiratory protective devices, and determination of toxic gases produced by decomposition of cable insulation and plastic materials used in electrical equipment.

Approximately 19,000 samples of gas and dust were analyzed, guiding Bureau technicians in preparing recommendations to curb explosion and health hazards in mines, aiding in the control and extinguishment of mine fires, and determining places in mines where dangerous quantities of methane were being released, where ventilation was inadequate, and where injurious concentrations of harmful gases and dusts were present. The results also were helpful in evaluating hazards

associated with noxious gases in tunnels and military establishments, exhaust gases from Diesel locomotives, and rock-dusting materials.

Owing to the importance of the analyses of gas and dust samples in evaluating hazardous conditions, studies were continued to improve the various analytical procedures used for determining atmospheric contaminants. Definite advances were made in methods for collecting and indicating the concentration of dust and other injurious contaminants in the air.

Dust studies were made in more than 50 anthracite and bituminous-coal mines, and encouraging results have been obtained in the control of coal dust through better utilization of water to allay it and more efficient ventilation to dilute it to concentrations that are not harmful. Direct assistance was given in numerous instances in the installation of control measures, and indirect assistance was given by training mine personnel in dust collection and analysis techniques and by providing information on the effects and control of harmful substances. Inspections were made of change houses at both anthracite and bituminous-coal mines, and information will be published on the construction and operation of best types.

Approval testing of respirators was continued, and information on their proper use and maintenance was disseminated. A new approval schedule for nonemergency gas respirators was issued.

Observations were continued on the use of Diesel locomotives, tests being made in tunnels and roundhouses.

Confidential studies were conducted for the Navy Department's Bureau of Ships on the performance of various gas-indicating instruments and on the nature of the gaseous decomposition products of electric cable insulation and of thermosetting synthetic resins. This information will be of value in combating hazards in the mineral industries when these materials receive industrial application.

ECONOMICS OF MINERAL INDUSTRIES

The reduced military requirements for many metals and minerals and the gradual relaxation of restrictions on civilian uses subsequent to victory in Europe brought about various revisions in the economics and statistics services of the Bureau of Mines at the close of the fiscal year. These services which had provided invaluable information on production, stocks, distribution, and consumption of minerals for the guidance of industry and Government during the war were modified to meet the needs of the reconversion period. A host of new problems demanding immediate attention required a slight expansion of this fact-finding program.

The war had clearly demonstrated the need for importation of minerals not available in adequate quantities from domestic sources, compelling the Bureau to give more consideration to foreign supply

and to the conservational aspects of mineral utilization. In addition the disposition of immense quantities of scrap metal, the need for national stock piles of strategic and critical materials, and similar controversial but vital problems arose. The Bureau of Mines immediately began the collection, interpretation, and dissemination of the up-to-date, accurate information necessary for a solution of these problems.

In mobilizing for effective action, the Bureau did not overlook other postwar problems of mineral supply and development. Marketing studies and other types of economic analysis as well as basic fact-finding are required by industry to meet reconversion questions and by Government to determine sound policies for utilization of surplus war plants, to appraise postwar prospects for employment in the mineral industries, and to plan for the wide use of mineral resources in river-valley projects. The mounting costs of mineral production require careful study of the effects of taxation, transportation, wages, and other cost factors on the conservational use of mineral resources. Although the Bureau was insufficiently staffed for work of this kind, the program was initiated pending the anticipated granting of increased appropriations by the Congress for these studies.

Metals

During the fiscal year 1945, the peak was passed in the wartime effort to obtain a balance between mineral supplies and requirements. Plans for a smooth and orderly transition from war to peacetime activities in the metal industry began to take shape in a period which began shortly after the successful Allied landing on the Normandy coast.

Originally organized to meet growing industrial and governmental needs for factual information on the status of nearly all metals, the metal-reporting service of the Bureau of Mines was broadened during the early phases of the war to provide more frequently and in greater detail the basic data required by war agencies to direct and control distribution for military and essential civilian products. Now, in addition to the extensive series of confidential and published reports, numerous special studies were made for use in stock-pile planning, surplus industrial property disposal, standard commodity classification, and other programs of various agencies.

Victories in the military campaigns permitted a broad relaxation of censorship rules at about midyear. In view of the great number of requests for economic and statistical data which were received, indicating a growing consciousness by industry of the need for authoritative, factual information for guidance in the reconversion and post-war period, the Bureau made preparations to revise various metal canvasses which it has regularly conducted so as to include the

desirable features of those carried out by war agencies in order that continuity would not be interrupted when the emergency agencies were disbanded.

Nonmetallics

Supplementing its regular annual and other periodic statistical reports in the highly diversified field of nonmetallic minerals, the Bureau of Mines prepared for the war agencies special monthly or quarterly canvasses on minerals of noteworthy military importance and provided the answers to inquiries on current supply situation, new developments and uses, and various other factors associated with the industries.

To make this service possible, the Bureau's extensive information files on the nonmetallics were augmented with several thousand items of current data. Furthermore, field trips were made to areas where supply problems demanded attention with respect to such war minerals as asbestos, barite, graphite, and magnesite. For the third year, the Bureau prepared monthly and confidential series entitled "Mineral Trade Notes" and comprising abstracts of consular and other reports primarily on foreign mineral developments, for use of various war agencies.

Special reports were written on such critical minerals as optical crystals, graphite, corundum, and phosphate rock. A comprehensive survey was prepared covering international trade in all nonmetallics, and a 33-year history of the chemical raw material and fertilizer industries was issued. General reviews were compiled for the technical press of all major developments in the broad and complex field of nonmetallic minerals.

Petroleum and Natural Gas

During the war, much of the information normally published by the Bureau of Mines on the production and demand for crude petroleum, natural gas, and their products was available for confidential use by Government agencies only. In anticipation of the termination of such restrictions, the Bureau undertook to prepare special reports to show the major changes in demand on the domestic and world markets.

In the United States, the major oil problems of the postwar period will include the future rate of crude production, restoration of the normal supply of motor vehicles, and the expansion of aviation. Outside the United States, the discovery of new reserves in the Middle East, the increase in crude production in the Caribbean region, the restoration of devastated refineries and oil fields, and the future rate of consumption in enemy countries will materially change the international trade in crude oil and its products and make essential more complete and accurate information on oil supply and demand.

During the year, the Bureau of Mines made numerous special economic studies of distribution and trends of consumption in the field of petroleum. Its work also included collection of comprehensive statistics on refinery operation, including the production of aviation gasoline; the preparation of monthly forecasts of demand for crude petroleum; an annual survey of the consumption of fuel oils by States and uses; the production and distribution of natural gas, natural gasoline, related products, and carbon black; and assembly of data on foreign oil production and competitive trends in international trade in crude petroleum and refined products.

Well-developed before the war, the Bureau's services made possible an accurate analysis of the changes in demand during the war and will be of equal value in indicating postwar readjustments.

Coal

Now encompassing bituminous coal as well as anthracite, lignite, and other solid fuels and byproducts, the detailed studies of the Bureau of Mines on requirements, production, shipments, and use provided information indispensable to carrying out the distribution and pricing programs of the Solid Fuels Administration, War Production Board, Office of Price Administration, and other Government agencies concerned with solid-fuel shortages. This information served as a basis for the equitable distribution of anthracite, low-volatile, and special-purpose coals at a time of unprecedented demand and acute shortage. When broad-wage-scale revisions in all production coal fields required corresponding changes in maximum prices, the statistical facilities and trained personnel of the Bureau were made available to the war agencies in working out the adjustments.

Well-established weekly, monthly, and annual reports published by the Bureau were continued on an expanded scale, particularly those concerning the distribution of bituminous coal, anthracite, and lignite. Detailed studies were made on the production, consumption, and resources of coal in eastern European and Far Eastern countries at the request of the Combined Production and Resources Board. Staff members also worked closely with the Technical Industrial Disarmament Committee in the preparation of a report on the German solid fuels industries from a standpoint of national security.

Foreign Minerals

A program for postwar activity initiated a year ago developed during the fiscal year 1945 to a stage where adjustments in personnel and procedure were required to enable the Bureau of Mines to participate more actively in foreign investigations.

If the Congress approves legislation sponsored by the Department of State, the Bureau proposes to establish 18 regions throughout

world and assign competent technical specialists to the United States Foreign Service to aid this Government on problems relating to supplies of mineral raw materials. At the request of the Department of State, the Bureau now is extending mining and metallurgical technical assistance to Brazil under a \$25,000 congressional appropriation which restricts the investigations to those minerals in which the United States is deficient.

Several Bureau engineers visited Mediterranean and other European areas as studies of foreign mineral resources were extended to include areas liberated during the fiscal year 1945.

Accident and Employment Data

With critical labor shortages in the mineral industries focusing attention on accident prevention as a primary means of conserving manpower, information compiled by the Bureau of Mines on frequencies and causes of accidents and related employment data were used widely by the War Manpower Commission, War Production Board, and other Federal agencies charged with war labor procurement and production maintenance duties.

A confidential monthly series of employment and productivity data on bituminous-coal mines, assembled on a Nation-wide basis and later on a State basis were supplied to several war agencies. Mineral industry employment information was used to gage transfers of labor from unessential to necessary mining or war work and to measure the effective mine-labor force in localities and regions.

Detailed analyses of individual accident reports on the cause and severity of coal-mine injuries were undertaken through the Coal Mine Inspection Act as a standard feature of the Bureau's work. In addition to usual uses, virtually all of the regular accident statistics on the metal, nonmetal, and mineral fuel industries were used in one or more ways for war purposes. Facts on the constituents and consumption of industrial explosives were required by the armed forces as well as by those permanently interested in explosives production and markets.

PUBLIC REPORTS

During 1945 the volume of publications prepared and issued by the Bureau of Mines increased somewhat in response to a rising demand from industry, war agencies, and the public for informative material on virtually every subject associated with the mineral industries. In all, there were 660 publications, which required editing 20,520 pages of copy, reading proof, and preparing 2,437 illustrations for processing. The publications included 124 bulletins, technical papers, Minerals Yearbook chapters, miners' circulars, and other printed reports; 230 special war minerals reports for restricted use; 107 reports of investigations and information circulars; 177 speeches and

papers for the technical press; and 22 miscellaneous manuscripts, together with numerous periodic statistical reports for industry.

As in all the war years, however, the number of copies printed and distributed was restricted to the barest minimum to save funds and paper and the total number of copies issued remained substantially unchanged. Security restrictions on the distribution of the Minerals Yearbook were lifted after VE-day, making this authoritative publication again available.

The Bureau's Washington library of selected reference material was increased by 2,351 books and pamphlets and 207 bound volumes of periodicals; 247 periodicals were received regularly; and 19,611 books and periodicals were loaned for use outside the library. Approximately 5,000 readers visited the library for reference work, and about 4,500 telephone calls were received. The catalog of the library's collections was increased by 8,066 cards.

Free educational motion-picture films, produced under the Bureau's supervision and paid for by private industry, were shown on 84,959 occasions to audiences totaling 7,932,361 persons. Three new sound films entitled Sand and Flame, A Story of Copper, and A Story of Arc Welding, were added to the Bureau's library of more than 10,000 reels. The last-named is the first Bureau film in technicolor. These films, shown in many countries, were in constant demand for war training and rehabilitation classes, Army and Navy personnel, engineering and scientific societies, business and civic groups, schools and colleges, and other groups.

The Bureau continued to effectuate its policy of the widest possible dissemination of its technologic, economic, and scientific information consistent with national security, and made plans for reprinting and even wider distribution of its reports upon the termination of hostilities, in response to an ever-growing demand from industry for such information.

ADMINISTRATION

As in past years, activities of the Bureau of Mines were administered from Washington, D. C., but were carried on largely in the field offices, laboratories, and pilot plants. To handle more efficiently the large volume of administrative work, an Administrative Service was organized to include the divisions of Personnel, Field and Property, and Budget and Finance.

Personnel

On June 30, 1945, there were 3,974 full-time employees in the Bureau of Mines, distributed as follows:

Classification and number of appointees

	P & S	SP ¹	CAF	CPC ²	Total
Department.....	138	3	622	11	774
Field.....	920	364	763	1,153	3,200
Total.....	1,058	367	1,385	1,164	3,974

¹ Includes instrument makers, safety instructors, laboratory aids, assistants, etc.

² Includes laborers, mechanics, messengers, wage employees, etc.

Property

As of June 30, 1945, the property of the Bureau had a total cost of \$9,960,310.98, of which \$3,114,745.06 was for land, buildings, and improvements; \$2,368,139.74 for laboratory equipment; \$1,720,908.57 for machinery and power-plant equipment; and the remainder for office furniture and equipment, automobiles and trucks, rescue cars and specialized apparatus, and other goods.

Finance

The total funds available to the Bureau of Mines for the fiscal year ended June 30, 1945, including direct appropriations, departmental allotments, reappropriated balances, and sums transferred from other departments for service work, were \$28,988,520. Of this amount \$20,926,543 was spent, leaving an unexpended balance of \$8,061,977. In the regular work of the Bureau, \$19,162,455 was expended. These figures are subject to revision because of unpaid obligations.

Table 1 presents classified information regarding the financial history of the Bureau for the fiscal years ended June 30, 1942-46.

Table 2 gives a statement of the distribution of congressional appropriations to the services and divisions and the expenditure of these funds in 1945 by Bureau divisions.

TABLE 1.—Bureau of Mines appropriations and expenditures, fiscal years ended June 30, 1942-46

Fiscal year	Appropriated to Bureau of Mines	Departmen- tal allot- ments ¹	Funds transferred from other de- partments ²	Total funds avail- able for expendi- ture	Unexpended balances	Total expendi- tures	Expenditures, ex- clusive of service items ³
1942.....	\$8,910,388.68	\$97,490	\$2,223,026.41	\$11,230,905.09	\$1,823,415.21	\$9,407,489.88	\$8,747,726.21
1943.....	28,707,630.94	106,450	2,567,615.26	32,108,548.20	5,831,566.64	26,316,981.56	25,178,429.84
1944.....	20,969,098.00	91,300	3,460,898.00	25,476,222.00	7,565,660.00	19,821,562.00	17,962,090.00
1945.....	22,196,136.55	91,500	6,260,167.74	28,988,520.00	8,061,977.00	20,926,543.00	19,162,435.00
1946.....	18,979,984.38	6,500	2,562,161.00	21,578,644.38	-----	-----	-----

¹ Includes printing and binding, stationery, and contingent funds.² Includes proceeds from sales of residue gas.³ Service items include helium, and other investigations and services for other depart-
ments.⁴ Includes \$914,718.39 unexpended balance reappropriated, and balance of \$79,002.28
receipts from sale of helium and other products.⁵ Includes \$976,885.27 unexpended balance reappropriated, and balance of \$128,018.51
receipts from sale of helium and other products.⁶ Includes \$4,606,720.72 unexpended balance reappropriated, and balance of \$202,723.66
receipts from sale of helium and other products.⁷ Includes \$4,669,644 unexpended balance reappropriated, and balance of \$291,152 re-
ceipts from sale of helium and other products.⁸ Includes \$4,720,098 unexpended balance reappropriated, and balance of \$385,084 re-
ceipts from sale of helium and other products.⁹ Includes stationery and contingent funds.

Division or branch	Salaries and expenses	Operating cars and stations and investigation of accidents	Coal-mine inspections and investigations	Salaries and expenses enforcement of Federal Explosives Act	Protection of mineral resources and facilities, including petroleum	Testing fuel	Anthraxite investigations	Synthetic liquid fuels	Mineral investigations	Oil and gas investigations	Purchase of land, etc., Bartlesville, Okla.	Expenses mining experiment stations	Care, etc., buildings and grounds, Pittsburgh, Pa.
Office of the Director.....	\$29,309	\$173										\$81	
Office of Minerals Reports.....		23,891	\$32,950	\$6,643	\$8,664	\$8,547	\$3,163	\$12,774		\$2,391		25,781	
Total.....	29,309	24,064	32,950	6,643	8,664	8,547	3,163	12,774		2,391		25,862	
Administrative Service.....	42,012	12,422	18,529	35,121	313	4,145	428	59,148	\$18,220	33,319		19,721	\$58
Mining and Metallurgical Branch.....									110,154			18,155	
Central region.....									39,525			55,210	
Eastern region.....									68,357			319,778	
Western region.....									173,435			475,362	
Fuels and Explosives Branch:													
Fuels Division.....		195,726	30,261	2,438	1,752	426,120	76,409	11,781	15,302				159,239
Explosives Division.....		90,554		73,155				1,079,064		620,532	\$3,477		
Petroleum and Natural Gas Division.....								1,433,834					
Synthetic Liquid Fuels Division.....													
Total.....		286,280	30,261	75,593	1,752	426,120	76,409	2,524,679	15,302	620,532	3,477		159,239
Economics and Statistics Branch:													
Coal Economics Division.....													
Foreign Minerals Division.....													
Metal Economics Division.....													
Accident Analysis Division.....			16,461										
Nonmetals Economics Division.....													
Petroleum Economics Division.....													
Total.....			16,461										
Health and Safety Branch:													
Coal Mine Inspection Division.....			829,820										
Safety Division.....		400,911	15,554										
Health Division.....		60,371	59,738		1,460								
Mineral Protection Division.....				419,239	133,900								
Explosives Control Division.....													
Total.....		461,282	905,112	419,239	135,360								
Total appropriations.....	76,165	797,595	1,024,480	575,000	250,000	439,825	81,000	5,000,000	435,000	657,640	6,025	922,000	160,000
Total expenditures.....	71,321	784,048	1,003,313	536,596	146,089	438,812	80,000	2,596,601	424,993	656,242	3,477	914,088	159,297
Balances.....	4,844	13,547	21,167	38,404	103,911	1,013	1,000	2,403,399	10,007	1,398	2,548	7,912	703

TABLE 2.—Bureau of Mines expenditures, fiscal year 1945—Continued

Division or branch	Economic minerals industries	Investigation of raw material resources for steel production	Gaseous and solid fuel reduction of iron ores	Manganese beneficiation pilot plants	Production of alumina from low-grade bauxite, aluminums clays and alunite	Investigation of bauxite and alunite ores and aluminums clays deposits	Magnesium and pilot research	Investigation of deposits of critical essential minerals in the United States and its possessions	Development of processes for recovery of waste materials	Construction and equipment of helium plants	Helium production	Protection of experimental coal-mine property from mine fire	Reduction of critical zinc concentrates with methane gas
Office of the Director	\$7,893	\$19,309	\$98		\$5,011	\$568	\$1,334	\$20,141			\$145		\$26
Office of Minerals Reports													
Total	7,893	19,309	98		5,011	568	1,334	20,141			145		26
Administrative Service	38,025	42,081	23,205	\$29,805	25,902	57,674	19,018	55,581					
Mining and Metallurgical Branch		90,718	7,035	12,105	14,427	16,560	8,587	90,484					
Central region		917,810			43,852	1,083,858	2,122	800,291		\$11,927	25,483		1,016
Eastern region		967,683		6,643	289,570	229,486	39,091	587,604					63,577
Western region		865,214	207,460	599,087	216,916	67,614	434,863	1,234,563	58,237				
Fuels and Explosives Branch:													
Fuels Division		72,579						84,345			2,220	\$23,567	
Explosives Division													
Petroleum and Natural Gas Division										205,249	952,809		
Synthetic Liquid Fuels Division													
Total		72,579						84,345		205,249	955,039	23,567	
Economics and Statistics Branch:													
Coal Economics Division	33,087												
Foreign Minerals Division	76,581												
Metal Economics Division	226,605												
Accident Analysis Division	64,426												
Nonmetal Economics Division	72,139												
Petroleum Economics Division	62,601												
Total	525,429												
Health and Safety Branch													
Coal Mine Inspection Division													
Safety Division													
Health Division													
Mineral Production Division													
Explosives Control Division													
Total													

Division or branch	Drainage tunnel, Leadville, Colo.	Experimental plant for synthesis of motor fuel, Pittsburgh, Pa.	Development and operation of helium properties (special fund)	Maintenance Bureau of Ships	Emergency fund for President, national defense (allotment to Interior, Bureau of Mines)	Emergency fund for President, national defense (allotment to Interior, Office of Secretary)	Salaries and expenses, Solid Fuels Administration for War	Working funds	Printing and binding	Contingent	Total
Office of the Director	\$1,089						\$14,271		\$82		\$45,005
Office of Minerals Reports							11,172		4,941		205,442
Total	1,089						25,443		5,023		250,447
Administrative Service							30,550		9,097	\$6,178	622,233
Mining and Metallurgical Branch			\$2,182								368,325
Central region									1		3,006,246
Eastern region									2,543		2,588,992
Western region	7,864								3,513		4,285,921
Fuels and Explosives Branch:											
Fuels Division											1,842,318
Explosives Division							147,193	\$588,849	4,062		165,613
Petroleum and Natural Gas Division			45,978					43,014	1,263		2,950,424
Synthetic Liquid Fuels Division									301		1,433,834
Total			45,978		465		147,193	632,504	5,626		6,392,189
Economics and Statistics Branch:											
Coal Economics Division									328		812,093
Foreign Minerals Division							778,678		50		76,631
Metal Economics Division								85,210	35,355		347,170
Accident Analysis Division									8,952		104,366
Nonmetals Economics Division									1,240		73,379
Petroleum Economics Division									211		52,902
Total							793,205	85,210	46,136		1,466,541
Health and Safety Branch:											
Coal Mine Inspection Division									295		832,491
Safety Division				\$14,627				79	7,279		438,450
Health Division											121,569
Mineral Protection Division											133,900
Explosives Control Division									7,574		426,813
Total				14,627				79	15,148		1,953,223
Total appropriations	21,980	100	433,844	28,000	1,872		1,011,724	935,506	85,000	6,500	28,988,520
Total expenditures	8,953		48,160	14,627	465		996,361	717,793	79,513	6,178	20,926,543
Balances	13,027	100	1,385,084	13,373	1,407		15,333	1,217,713	5,487	322	8,061,977

1 Available for expenditure in fiscal year 1946.

Geological Survey

W. E. WRATHER, *Director*



THE science of geology, no less than the other sciences, is becoming increasingly important to the Nation's social and economic welfare. The successful application of the principles of geology to the discovery and development of critically needed mineral resources and the successful application of geology for predicting terrain conditions in advance of our military operations represent some of the dividends that were paid to this country during the war as a result of the advancement of geology as a science.

Geology relates to the earth. The better we understand our earth—its composition, structure, and history—the better prepared we are to make the most of the land that we have.

Geological mapping is the mechanism by which our scientists determine the composition, structure, and history of the earth. Reduced to its simplest terms, geologic mapping consists of plotting on a plane map the intersections between the ground surface and the boundary planes that separate different kinds of rocks.

The agency responsible for making geological maps is the Geologic Branch of the Survey, and it plans to undertake extensive, systematic geologic surveys of many large areas of the country. These plans call for the utilization of every known refinement in mapping techniques and for the use of the most modern and varied techniques of geophysical exploration. Indeed, because even these will probably fall short of what should be done, the Survey plans also to carry out rather elaborate research to discover and develop new geophysical and geochemical methods of exploration and to continue and enlarge its research on the geologic and geochemical factors that determine the localization of mineral and mineral-fuel deposits.

The geologic mapping and research will cost something like 4 million dollars annually, for the work of searching hidden geology and determining ore controls is time consuming and costly. But geologic surveys repay their cost to the Nation many times over in augmented mineral wealth and economic benefits. The wartime work of the Geological Survey has already led to the discovery of 25 million dollars worth of new tungsten and mercury ores.

In addition to these domestic plans it is hoped that means can be found to continue and to extend the cooperative scientific work that has been conducted during the war by our Geological Survey and its equivalent agency in various foreign countries. These international projects not only bring mutual scientific benefits but they can become a strong contributing force toward better international understanding.

During the year the Alaskan Branch expended all of its efforts on projects that were carefully selected as being most pertinent to the successful carrying on of the war. The limitations of funds and personnel restricted the work to only a few of the more urgent projects. The projects carried on during the fiscal year were of three general kinds—investigations of deposits of minerals or search for deposits of minerals needed in the war, geologic investigations pertaining to problems of construction or maintenance of military or naval establishments, and planimetric and topographic mapping from aerial photographs.

Projects of the first kind were principally concerned with petroleum, coal, quicksilver, copper, tin, and zinc. Some of the petroleum work was carried on at the request of the Navy Department, and at that Department's expense.

Work of the second type included principally investigation of phenomena associated with permafrost, or permanently frozen ground, that bear directly on construction and maintenance activities over much of Alaska. This work was done at the request and expense of the War Department, and arrangements have recently been completed for continuing these investigations on an expanded scale in the fiscal year 1946. Brief investigation was made for the War Department of a volcano that erupted near an Army establishment in June. The purpose of the study was to determine the extent of danger to the establishment.

Work of the third type was the continuation of the compilation of aeronautical pilotage charts and maps from aerial photographs for the Army Air Forces. This work included the preparation of maps not only of parts of Alaska but of many other areas widely distributed over the world. In order to staff adequately this high-priority work it was necessary to postpone regular Survey planimetric and topographic mapping of Alaska although the need for more maps is continually becoming more acute.

In view of the greatly increased public interest in Alaska and the anticipated development of the Territory in the postwar period, it is planned to refocus the work of the Survey in Alaska to projects pertinent to the Territory.

Topographic mapping in the United States has proceeded at such a slow pace for the past 60 years that only a relatively small part of the country may be considered sufficiently well mapped to meet

present-day map requirements. One-half of the Nation is without topographic maps; the other half is provided with maps, but some of these are considered inadequate. This situation is deplorable, and action should be taken at once to make available maps essential to a survey of the natural resources of the Nation.

Topographic maps supply much of the basic data essential to a survey of the country's resources and are highly valuable for the economical and efficient planning of drainage, flood control, irrigation, water supply, hydroelectric and navigation projects; they decrease the number of expensive field surveys usually made in connection with the location of transmission lines, railways, highways, canals, tunnels, airports, and industrial plants and thereby reduce the cost of constructing such projects; they provide topographic data essential to the proper location of frequency-modulated and television radio stations and for recording and correlating data obtained from geologic investigations and thus aid immeasurably in the location, evaluation, and development of our mineral wealth. Maps of this kind provide information essential to the proper classification of the public lands, the conservation of the soil, and the administration and protection of the forests, both national and State. They are of great value for the administration and best utilization of the vast domain of public lands, enormous areas of which have never been mapped and concerning which administrative officials responsible for the enforcement of the public land laws are consequently without adequate knowledge of their extent, the character of the terrain, their intrinsic value, or the possibility of their development.

A comprehensive mapping plan is now being prepared in compliance with instructions from the Secretary of the Interior, under which, if funds are made available by the Congress, the serious handicap of inadequate map information could be overcome within the next 15 years. However, during the past year, as in other years since the beginning of the war, major emphasis has been placed on those operations that contributed directly to the war effort.

The authorized functions of the Geological Survey related to water consist of the collection and publication of information as to the quantity, quality, availability, and utility of the Nation's surface-water and ground-water resources. The quantities of both forms fluctuate widely because they are dependent on precipitation, which may range from 10 inches or less annually in arid regions, to 100 inches or more in humid regions.

Records of the fluctuations in available water are essential to its administration with respect to private, corporate, and governmental users, to interstate relations and compacts, to international problems and treaties, and to its efficient utilization for irrigation, navigation, sanitation, and power, for certain industrial processes, and for many

of the comforts of civilized life. As the available supply is inadequate in many places for the many uses that are made of water, the demands for it are conflicting, and pressing questions arise relating to priority of rights, superiority of use, and equitable division. Reliable information is essential to the stability of development, soundness of financing, efficiency of operation, and equity of adjudication and administration. Demands for reliable water information are therefore insistent and continuing. Moreover, information is wanted promptly when it is needed, and little or no time is available for collecting it. Therefore, needs for it must be anticipated and investigations must be started in advance of the probable call for the results.

It is the Survey's policy and duty to collect the essential information as to water resources as rapidly as funds will permit, giving priority to places of probable most urgent need. However, water investigations are largely financed by means of cooperation with States and municipalities, which leads to uneven distribution of investigations among the States. Such financing has the advantage of assurance that investigations will generally be made in those places where the need for them is most pressing, and the disadvantage that little or no provision may be made for starting investigations that will have more specific reference to needs that are not now pressing but will certainly be in the future. In recent years a program of gaging stations and observation wells supported by Federal funds and not dependent on the availability of cooperative State and municipal funds has been inaugurated and gradually developed. This program is, however, still inadequate and is especially weak with respect to observation wells and to the quality of surface waters that have been seriously polluted in places by municipal and industrial wastes during recent years, especially during the war. The Federal program should be continued and expanded. It will serve not only to supplement the cooperative programs but also to provide a net of observation stations, well distributed throughout the country, that will not be liable to breaks resulting from fluctuations in cooperative funds.

The classification of the public lands of the United States as to mineral and water resources and the supervision of operations for the development of these vital natural resources without waste are functions of the Conservation Branch. This work involves intricate problems of geology, engineering, economics, and administration in complying with legislation enacted by the Congress, which contemplates that these resources shall be developed by private initiative in accordance with wise conservation practices. The activities include field investigations and preparation of reports dealing with water power, fuels, minerals, and chemicals essential to national war and postwar programs.

In carrying out the land-classification functions, Government agencies by administrative arrangement are furnished information concerning undeveloped resource values in the form of special reports concerning individual parcels of land involved in applications for sale, lease, exchange, or other forms of disposal. It is an essential service in the proper administration of Federal land in order to insure appropriate and timely use of such property. Advance determination of economic values also assures proper and adequate return for all disposals of such property and compliance with applicable Federal law. In the avoidance of duplication of such essential services by the numerous Federal agencies having need therefor, it is estimated that a saving of not less than 2 million dollars a year is effected in the costs of land administration. Whenever the information so obtained will be useful for the general public in encouraging development of the resources, reports are prepared for public distribution, and local offices are open for consultation by technical personnel employed by private interests. Such services are of indeterminate value to the general public.

The supervision of operations constitutes a technical service which assures use of sound scientific principles in the development of the resources under supervision. The estimated value of production from all public-land mineral resources under supervision has increased from somewhat more than 69 million dollars in 1935, to a present annual worth of nearly 150 million dollars, and during the same period royalty accruals have increased from 6.75 to 11.64 million dollars a year. The oil, gas, coal, lead, zinc, and other mineral resources under leases supervised by the Branch have a value estimated in excess of 2 billion dollars.

It is expected that discoveries of new deposits during the postwar years will increase the known reserves materially. Proper engineering practices will increase the ultimate economic value of these, probably not less than 50 percent.

GEOLOGIC BRANCH

The Geological Survey is, in a sense, custodian and appraiser of the Nation's mineral wealth. How great that wealth is may be judged from the fact that the aggregate value of all the mineral and mineral-fuel resources produced in the United States up to the end of 1943 was approximately 8 billion dollars. The reserves in the ground that are now known or are being worked are estimated to be worth more than 6 trillion dollars and to that must be added all the yet undiscovered mineral wealth. Until a vast amount of geologic and geophysical investigation and research are done no one can give even a "guesstimate" of the probable value of these total resources. Suffice it to say that 6 trillion dollars plus another large but unknown amount

is staggeringly huge. More than 90 percent of this huge value, however, is locked up in our colossal coal reserves. In other fuels and most metals we are much less well off.

In meeting the requirements for war our Nation has taken a heavy toll of its mineral resources. Of our known commercial reserves, we have depleted 97 percent of our mercury, 78 percent of our chromium, 70 percent of our vanadium, and comparable amounts of manganese, tungsten, zinc, and copper. Our fluorspar resources are being depleted four or five times as fast as in normal times, and peacetime adaptations of wartime uses will cause heavy demands after the war. War requirements have strained available resources of petroleum to the limit, and in some pools reserves in the ground have been endangered by too heavy withdrawals.

Discovery of new deposits can counter this depletion but because the easily discoverable deposits have already been extensively exploited, it will be necessary to expand old techniques of exploration and to develop new ones capable of finding obscure and deeply hidden deposits that have no easily discernible surface manifestations.

Geologic mapping is the first need in the search for hidden deposits of minerals. As the search becomes more intense and more difficult larger-scale geologic surveys are required. At the present time not more than 7 percent of the United States has been mapped geologically on scales adequate to serve the modern discovery program necessary to sustain our industries.

The Geological Survey plans to undertake extensive and systematic geologic surveys of many large areas of the country. These plans call for the utilization of every known refinement in mapping techniques and for the use of the most modern and varied techniques of geophysical exploration. Indeed, because even these will probably fall short of what should be done the Survey plans also to carry out rather elaborate research to discover and develop new geophysical and geochemical methods of exploration and to continue and enlarge its research on the geologic and geochemical factors that determine the localization of mineral and mineral-fuel deposits. Some of the techniques and methods developed by the unit will be of great value in the planning and construction of peacetime engineering projects, such as the selection of airport sites, highway alignments, dam construction, and municipal planning and development. Any large-scale construction project necessarily must be adapted to the geological and soil conditions at the site.

The limit of the Nation's capacity to produce oil efficiently from known fields was reached during the war, and forecasts for the postwar years indicate even greater requirements. This emphasizes the necessity for an accelerated rate of discovery. Geologic investigations directed toward this end have been conducted vigorously, and success

in finding new sources of petroleum is confidently expected. Nevertheless, prudence demands that we appraise the potentialities of substitutes for liquid petroleum. The oil shales and the low-rank coals, especially those of the Rocky Mountain States, afford a source of substitutes in large quantity, and extensive field investigations of them should be undertaken now.

Expansion and redistribution of industry during the war has created local problems of coal supply requiring special investigations. One of the most pressing of these problems concerns the need for supplies of coking coal to sustain the new steel industry of the Salt Lake Valley, Utah, and of the Pacific coast.

Geologic maps pay extra dividends in appraising surface and underground water resources, in making soil surveys, in planning intelligent soil-conservation programs, and in the planning and execution of large engineering construction projects and reclamation programs.

During 1945 the work of the Geologic Branch was devoted strictly to war projects.

The Military Geology unit, at the request of the Military Intelligence Division, Office of the Chief of Engineers, expanded its terrain studies and also filled requests for more than 50 geologists to be detailed to the theaters of operation on assignments concerned with the preparation of operational intelligence or as scientific consultants in combat zones. Numerous official commendations prove the value of applying scientific methods for predicting terrain conditions in advance of operations.

New sources have been sought for certain rare elements that were needed for secret war projects like the atomic bomb. In addition to extensive field studies new techniques, both for field and laboratory use, have been developed to aid the discovery program. This part of our work is receiving much attention because of the tremendous peacetime implications of harnessing atomic power.

Our work on metallic minerals has emphasized basic geologic studies of the principal ore-producing districts in order to provide a proper foundation for further exploration. Some of this effort has already produced results: At San Manuel, Ariz., the Geological Survey cooperated with the Bureau of Mines in a drilling program that indicated copper reserves of possibly as much as 64 million tons of ore averaging 0.8 to 0.9 percent of copper, which is a small fraction of a percent below the 1.0 to 1.1 percent copper ores worked in large volumes in Utah and Arizona. About 10 million tons of bauxite ore have been added to the known national reserves of about 75 million tons as a result of investigations conducted jointly during the past 4 years by the Geological Survey and Bureau of Mines.

Under the auspices of the State Department and the Interdepartmental Committee for Cultural and Scientific Cooperation, 13 mineral

commodities were investigated cooperatively in Mexico, Cuba, Chile, Brazil, the Dominican Republic, and Haiti. The Geological Survey frequently in the past has been host to representatives of foreign Geological Surveys who have visited this country. More attention should be given to the cultural and scientific benefits that accrue from the visits of foreign scientists here and the visits of our scientists to foreign countries.

ALASKAN BRANCH

During the year the geologic work of the Alaskan Branch was devoted to projects that seemed to promise immediate results in terms of satisfying the war needs of the Nation for certain mineral commodities and supplying direct benefits to the war agencies engaged in activities in Alaska. The intense search for and examination of Alaskan mineral deposits during the war has clearly demonstrated the need for continuing in the postwar period the making of an adequate inventory of Alaska's mineral resources.

The war years have seen a greatly increased public interest in Alaska. The Alaskan Branch in its activities has reflected this interest, and its expanded and pointed war program has illustrated the sound basis for such interest. The field investigations of the twoscore members of its technical staff, during the short seasons imposed by climatic conditions, have resulted in the issuance of a series of reports covering detailed examinations of a large number of mineral deposits, some whose worth was previously undetermined, others whose very existence was uncertain. While few of these deposits have as yet reached the stage of commercial development many stand available as sources of added raw materials should our country face greater or long-continued needs for such mineral commodities. As a result of these relatively limited studies the reserves of many of the war minerals present in the Territory have been substantially increased. For example, quicksilver, formerly considered as a resource of only minor significance, has become one of the important commodities which are now commercially produced in Alaska. The work of the Alaskan Branch geologists has increased known coal reserves by millions of tons. The mining of gold, in peacetime Alaska's major mineral industry, has been seriously curtailed by the war.

Not only has no significant percentage of Alaska's mineral resources been consumed in our war effort, but her mineral wealth is still so slightly tapped that any calculation in terms of dollars and tonnage reserves can be only a rough approximation. The Alaskan Branch, which has never numbered more than 40 geologists and through most of the half century of its life has numbered between 5 and 10 men, has spread its efforts widely over most of Alaska's nearly 600,000 square miles and has accumulated a considerably body of sound and

lasting information, but the task ahead is tremendous. As a result of these activities the known value of Alaska's mineral resources can be set at a minimum of several billions of dollars.

The accelerated war program has been coordinated with the anticipated future development of the Territory. Many of the thousands of servicemen who have passed through or have been stationed in Alaska have become greatly attracted to the Territory. Never again will there be a lack of interest in the Territory. With the growing interest in Alaska are coming increased inquiries as to the possibilities there for newcomers. Information as to Alaska's mineral resources is sought daily from the Alaskan Branch by servicemen, other private citizens, and corporations. As a result of its war program the Branch is better able to reply adequately to such questions than at any time in the past. But to provide complete answers to many of these questions, answers which will enable the questioner to plan his new life satisfactorily, far more is needed. The average postwar settler in Alaska can be helped immeasurably and the development of the Territory on a sound basis expedited if the Alaskan Branch and other Government agencies, each in its respective field, are able to supply the needed answers.

Alaska's development must be based on a sound and enduring economic structure, which has been established with an understanding of the aims and methods of sound conservation, not only for the safeguarding of Alaska's resources for the future but as well to insure the success of its prospective citizens in their varied ventures. One of the prime requisites for the establishment and maintenance of a highly developed civilization is the production and regular revision of a series of large-scale topographic maps of high detail and accuracy. The most efficient development of any area is impossible without the careful study of such maps. The most desirable locations for town sites, highways, reservoirs, airports, and a myriad of other works of man require at least initially a careful examination of detailed topographic maps. As a result of its work for the Army Air Forces, small-scale aeronautical pilotage charts have been completed by the Branch for the greater part of the Territory, but these, while they will serve as a springboard for future mapping activity, are inadequate to meet the demands of a developing civilization. Less than 1 percent of Alaska has been mapped in the detail and accuracy considered essential for areas of only moderate development in the United States.

With the production of such detailed maps should come a greater intensification of diversified geological examinations. Before the war the emphasis was placed on investigations contributory to the production of gold, during the war it was placed on the development of minerals essential to the war program, and now the postwar emphasis must be on a diversified mineral production. The development of

deposits of nonmetallic mineral commodities, such as limestone, gypsum, marble, and other building stones, and clay, gravel, and sand may make important contributions to the establishment of a sound and stable society in Alaska. Alaska's fuels, her coal and perhaps her petroleum, may prove sufficient when adequately developed to satisfy not only her own needs but to sustain a considerable "export" trade as well. Many of these materials or their finished products are being shipped to Alaska today when Alaskan reserves, as yet practically undented, may be able to offer the same or better materials with lower costs and greater efficiency. Along with its postwar development of such mineral resources the Branch must continue at an increased tempo the delimitation of areas in which the production of metallic minerals is, or may become, possible. It is the duty of the Alaskan Branch to provide the basic information necessary for the continuation, expansion, and greater diversification of Alaska's mineral industry.

During the field season of 1944, which included the latter part of the fiscal year 1944 and the early part of the fiscal year 1945, the Alaskan Branch, through its regularly appropriated funds, carried out 15 specific projects and 4 supervisory projects, the majority of which were devoted to petroleum, coal, quicksilver, copper, tin, and zinc investigations.

The program for the field season of 1945 has been influenced in compliance with the needs of certain units of the War and Navy Departments. In the latter part of the fiscal year 1945 about two-thirds of the technical geologic personnel of the Alaskan Branch of the Geological Survey were engaged on projects designed to meet these needs. In addition six projects relating to mineral commodities for which there was an acute demand to meet war needs were in progress at the close of the fiscal year 1945.

A major activity of the Alaskan Branch throughout the fiscal year has continued to be the compilation of aeronautical pilotage maps and charts from photographs furnished by the Army Air Forces, and financed with funds transferred to the Geological Survey from the Air Forces.

During the 1945 fiscal year 3 bulletins were published, 8 preliminary mimeographed reports on strategic and critical mineral investigations, 7 press releases embodying technical information and designed to take the place of preliminary reports pending regular printing of the results, 1 geologic and topographic map accompanied by a brief report, and 12 other press releases were issued.

TOPOGRAPHIC BRANCH

The headquarters offices of the Topographic Branch and the Atlantic Division are in Washington, D. C.; the headquarters office of the Central Division is in Rolla, Mo.; and that of the Pacific

Division is in Sacramento, Calif. Section offices are maintained in Chattanooga, Tenn., and Arlington, Va.

General Office Work

The major part of the year's activities of the Topographic Branch was directed toward producing maps in manuscript form from aerial photographs made for the War Department. Approximately 80 percent of the time and services of the personnel of the Arlington, Va., and Chattanooga, Tenn., groups was devoted to the mapping or supervision of mapping of areas in foreign countries for use of the Armed Forces. In all, 64,084 square miles were mapped by these facilities, of which 59,810 square miles were completed before VE-day.

Of the domestic maps published during the year, 183 were within the strategic areas designated by the War Department, thus increasing to 586 maps the total published of those areas since the declaration of war.

Section of computing.—Processing field notes of geodetic control surveys is the primary function of this section. The listed results are required by topographers and geologists in subsequent mapping processes of the Geological Survey. They are furnished regularly to the War Department, and, upon request, to other governmental organizations. As a public service, data for limited areas are available to geophysical prospectors, civil engineers, and surveyors throughout the United States. During the year lists for 374 quadrangle-map areas were issued in lithographed form, and many others were prepared as typewritten manuscript.

The section is engaged in occasional tests of field instruments and researches into computing methods. Instructions are prepared for the technical procedures used in both field work and office processing of leveling, transit traverse, and triangulation.

Section of photomapping.—The principal work of this section is the production of topographic maps from aerial photographs by stereophotogrammetric methods and the production of planimetric maps and planimetric bases for topographic field surveys by both stereophotogrammetric and graphic methods.

Topographic maps of areas in the United States produced during the year by these methods covered approximately 6,280 square miles; planimetric and base maps covered an area of approximately 8,688 square miles. Topographic maps of foreign areas were produced in manuscript form from aerial photographs for the War Department of an area of approximately 35,734 square miles. In addition, Geological Survey personnel working in cooperation with the Tennessee Valley Authority either completed or supervised additional foreign mapping for the War Department in the amount of 28,350 square miles.

At the principal office of the section, in Arlington, Va., in addition to the large production facilities, which are operating on a two-shift basis, there are also maintained a central laboratory for designing, testing, repairing, and adjusting all types of special optical and mechanical equipment utilized for stereophotogrammetric work and a photographic laboratory specializing on research and precision photography required for the other offices.

The Washington office maintains a general file of aerial photographs utilized in the work of the Geological Survey and of aerial photographic negatives that have been purchased under photographic contracts. Through this office contacts are maintained with other governmental agencies involved in aerial photographic work.

Section of cartography.—Work on the International Map of the World on a scale of 1:1,000,000 was continued. Sheets H-14 (Austin); H-15 (Mississippi Delta); I-17 (Savannah); I-18 (Hatteras); (K-10 (Mount Shasta); K-17 (Lake Erie); and L-10 (Cascade Range) were in progress, and sheet K-16 (Chicago) was in course of publication at the end of the year.

The preparation of the transportation map for the Public Roads Administration was continued. Compiling, inking, lettering, and editing was in progress for the States of Louisiana, Nevada, North Carolina, Ohio, and West Virginia. Fourteen sheets in New Mexico were published; 33 sheets in Texas are in course of publication; and 8 sheets in North Carolina were transmitted for publication.

The Columbia River Basin maps for the International Columbia River Engineering Board as well as other special maps were prepared for publication.

Section of inspection and editing.—During the year 249 quadrangle maps were edited for publication, 175 of which were for multicolor photolithography and 74 for engraving; 376 quadrangle maps, 15 State maps, and 10 State index maps were prepared and edited for reprint editions; 112 maps and diagrams that had been prepared as illustrations for geologic reports were edited; and 392 proofs of all kinds were read. On June 30 maps in the process of reproduction included 85 for engraving and 79 for multicolor photolithography; maps being edited or awaiting editing included 32 maps for engraving and 59 for multicolor photolithography; and 292 maps remained on hand for preparation for reprinting.

The Section of Inspection and Editing maintains in Arlington, Va., a small unit to draft maps produced by the Atlantic Division.

Map Information Office

The Map Information Office continued its work as clearing agency for data pertaining to maps and aerial photographs of both Federal and commercial agencies. The office maintains extensive card-index

and map files and is equipped to furnish data to Federal and State institutions and to the public.

Field Surveys

Topographic mapping was carried on in 35 States. Cooperative projects were conducted with 19 States and with the Tennessee Valley Authority.

Topographic mapping by the Geological Survey in the United States, Puerto Rico, and Hawaii, to June 30, 1945

State	Area mapped during fiscal year 1945 for publication on standard scales, contour intervals from 1 to 50 feet (square miles)				Total area mapped to June 30, 1945 (square miles)	Percentage of total area of State mapped to June 30, 1945	Control, fiscal year 1945		
	Field scale		New survey	Resurvey			Spirit levels (miles)	Transit traverse (miles)	Triangulation stations established
	1 to 24,000 or larger	1 to 48,000							
Alabama		194	194		26,078	50.5	344		
Arizona		325	123	202	33,521	29.4			9
Arkansas	265		16	249	24,630	46.3		39	
California		716	226	490	132,630	83.6	280	48	14
Colorado	332		109	223	58,265	55.9	118		26
Connecticut	71			71	5,009	100.0			
Delaware					2,057	100.0			
District of Columbia					69	100.0			
Florida					11,949	20.4			
Georgia	55			55	25,202	42.8		92	
Idaho	6		6		37,629	45.0	115		20
Illinois	111	708	819		45,837	81.3	81	289	
Indiana	395		395		8,184	22.6	124	74	
Iowa					14,233	25.3			
Kansas	2	221		223	65,852	80.0	68	11	29
Kentucky					27,559	68.2			
Louisiana		1,043	1,043		18,585	38.3	31	42	
Maine		605		605	25,977	78.2			
Maryland					10,577	100.0			2
Massachusetts	656			656	8,257	100.0			
Michigan	455	606	527	434	17,077	29.3	167	164	
Minnesota					9,542	11.4			
Mississippi					8,997	18.9			
Missouri	52	1,717	1,256	513	62,783	90.1			
Montana	27	402	429		39,741	27.0	55		
Nebraska					28,225	36.5			
Nevada		219	219		43,981	39.8	328		54
New Hampshire					9,304	100.0			
New Jersey					7,836	100.0			
New Mexico	15	505	520		36,676	30.1	75	38	27
New York	613	22		635	49,576	100.0			
North Carolina					19,574	37.1			
North Dakota		507	507		17,335	24.5	102	114	
Ohio					41,222	100.0			
Oklahoma	68	245	313		41,899	59.9	15	42	12
Oregon		438	438		36,119	37.2	103		13
Pennsylvania	899		640	259	43,563	96.1			
Rhode Island					1,214	100.0			
South Carolina					15,772	50.8			
South Dakota					20,750	26.9			
Tennessee	105			105	23,998	56.8			
Texas		204	204		92,736	34.7		1	
Utah		109	109		20,228	23.8	205		41
Vermont	194	79	79	194	9,365	97.5			
Virginia		413		413	38,097	93.3	245	276	
Washington		275	228	47	44,403	65.1	77		27
West Virginia		32		32	24,181	100.0			
Wisconsin		(1)			20,348	36.2		249	
Wyoming	48	128	176		35,818	36.6	101		27
Total or average	4,369	9,613	8,576	5,406	1,442,460	47.7	2,634	1,479	301
Hawaii					6,435	100.0			
Puerto Rico					3,370	98.8			

¹ Planimetric maps covering 1,638 square miles in Wisconsin, not included in total surveys, were compiled from aerial photographs with field examination.

The mapping of forty-three 15-minute quadrangles and ninety-six 7½-minute quadrangles was completed and mapping was in progress on forty-two 15-minute quadrangles and thirty-nine 7½-minute quadrangles at the end of the year. In addition, work on 132 quadrangles was progressing in some one of the steps prior to actual mapping. Of the 139 quadrangles completed and the 81 partly completed, 116 are within the strategic area designated by the War Department. For use in the investigation of strategic and critical minerals, including iron, copper, bauxite, alunite, high-aluminum clay, manganese, and zinc, 9 special projects were completed and 1 was in progress.

Mapping was accomplished on 16 projects in several States for the Army Engineers, War Department, for flood control. For the irrigation and reclamation of lands, 5 large-scale maps were in progress for the Bureau of Reclamation. The survey of the Olympic National Park in the State of Washington was continued.

Of the total area of the United States, 47.7 percent has now been covered by topographic maps produced by the Geological Survey.

WATER RESOURCES BRANCH

The Water Resources Branch collects and publishes basic information on the conditions and uses of surface water and ground water in all parts of the country. A widely scattered field force is needed for this work. About 100 field headquarters are maintained in which experienced men familiar with local problems related to water are available. Such decentralization serves well the purposes of cooperation, as close contact is thereby maintained between the Survey personnel and cooperating State and municipal officials, and information is available currently where urgently needed. During the emergency of war and now in preparing for peace the decentralization of the Survey's field forces has been especially valuable, because men who are specialists not only in water problems but also in local problems have been available in all parts of the country to conduct special field investigations and to furnish information promptly and efficiently.

Cooperation With States and Municipalities

States and municipalities provided more than a third of the funds for the Survey's water investigations during the fiscal year 1945. The amounts contributed for cooperation in each State are summarized below:

State:	Contribution	State—Continued	Contribution
Alabama.....	\$15, 000	New Hampshire.....	\$9, 208
Arizona.....	30, 900	New Jersey.....	23, 550
Arkansas.....	11, 250	New Mexico.....	41, 850
California.....	90, 730	New York.....	83, 378
Colorado.....	32, 550	North Carolina.....	24, 500
Connecticut.....	11, 430	North Dakota.....	13, 900
Delaware.....	2, 050	Ohio.....	29, 751
Florida.....	40, 620	Oklahoma.....	26, 130
Georgia.....	17, 200	Oregon.....	26, 075
Idaho.....	28, 050	Pennsylvania.....	41, 800
Illinois.....	15, 090	Rhode Island.....	2, 950
Indiana.....	26, 400	South Carolina.....	9, 050
Iowa.....	27, 745	South Dakota.....	4, 550
Kansas.....	35, 540	Tennessee.....	22, 100
Kentucky.....	25, 900	Texas.....	64, 300
Louisiana.....	31, 750	Utah.....	25, 908
Maine.....	7, 500	Vermont.....	6, 260
Maryland.....	16, 975	Virginia.....	33, 800
Massachusetts.....	17, 246	Washington.....	55, 587
Michigan.....	31, 375	West Virginia.....	9, 300
Minnesota.....	15, 790	Wisconsin.....	9, 388
Mississippi.....	15, 000	Wyoming.....	21, 200
Missouri.....	13, 055	Hawaii.....	43, 947
Montana.....	13, 810		
Nebraska.....	27, 520		
Nevada.....	10, 000		
		Total.....	1, 238, 956

Activities Carried on for Other Federal Agencies

Other Federal agencies provided about \$970,000 for water investigations that could not be financed by appropriated funds of the Geological Survey or included in cooperative programs. These agencies are the Office of the Chief of Engineers and the Mississippi River Commission, War Department; Bureau of Yards and Docks, Navy Department; Tennessee Valley Authority; Weather Bureau, Department of Commerce; Bureau of Reclamation, Fish and Wildlife Service, National Park Service, Office of Indian Affairs, Office of Land Utilization, and Bonneville Power Administration, Department of the Interior; Department of State; Defense Plant Corporation; Federal Power Commission; Federal Works Agency; War Production Board; Foreign Economic Administration; and Bureau of Prisons, Department of Justice.

War and Postwar Activities

Throughout the war the Geological Survey operated in an unusual degree as a consulting agency on matters related to the availability and chemical quality of water for war activities of all kinds. This service was based on the Survey's collection of essential facts gathered

over many years by means of both regular and special programs of investigation.

During the 4 years, July 1, 1941, to June 30, 1945, the Geological Survey made more than 15,000 special reports on water at the request of war agencies. Of these, 4,225 were made in the fiscal year 1945. There is no basis for exact estimates of the value of these reports. Many of them have given assurance of the adequacy of available water supplies and so have led to sound and efficient developments; adverse reports have prevented unwise development and waste of money in inefficient or useless construction. Some of the reports have certainly been worth many hundreds of thousands or even millions of dollars; others may have been worth not more than \$50, but assuming conservatively an average value of \$1,000 each, the over-all value of the 15,000 special reports has been at least 10 to 20 million dollars.

Other significant values of the service of the Geological Survey in relation to water are indicated by the fact that Federal agencies have for several years transferred to the Geological Survey nearly \$1,000,000 annually for special water investigations made in addition to the continuing programs conducted in cooperation with States and municipalities. No estimate has been attempted of the great value to private and corporate industry and to the general public. The values of water facts during the years of war are illustrative of even greater values in the many years of peace, when supplies will be more fully utilized and need for knowledge of them becomes more critical.

Continuing Activities

The operations of the Water Resources Branch have been conducted by five administrative divisions—surface water, ground water, quality of water, utilization of water, and power resources.

Records of the stage, quantity, and availability of surface waters are collected through 65 field offices at about 5,600 gaging stations distributed through every State and Hawaii, the number of stations depending largely upon the funds made available by 166 cooperating State and municipal agencies and by transfer from other Federal agencies.

The investigations of ground water relate to the water from which wells and springs are supplied. Investigations in nearly every State and Hawaii are conducted through 38 field offices and in cooperation with 74 State and municipal agencies. During the year, periodic measurements of water levels or artesian pressure were made in about 7,000 observation wells. Observations were continued to determine the depletion caused by the numerous war industries and other war establishments and to provide against possible shortages. Attention was also given to natural and artificial replenishment of the ground-

water supplies, and to their maximum utilization for the many prospective postwar demands. The war has caused heavy overdrafts on ground-water storage at many places. Data are not available for computing this overdraft exactly, but it may be as much as a few hundred billion gallons.

Chemical analyses of 2,048 samples of water were made in the Water Resources laboratory in Washington, and analyses of 4,867 samples were made in laboratories in Safford, Ariz.; Albuquerque, N. Mex.; Raleigh, N. C.; Stillwater, Okla.; and Austin, Tex. Many samples were collected in connection with studies of water supplies for Army and Navy establishments and for munition plants and housing developments. Cooperative studies of the chemical character of surface waters were started in Pennsylvania and Virginia and were continued in Florida, Georgia, Louisiana, New Mexico, North Carolina, and Texas. Samples were analyzed for cooperative studies of ground waters in other States. Interpretations of analyses or advice about water problems were furnished to other Federal departments and to independent agencies.

A variety of hydrologic and hydraulic studies and compilations were made on the utilization and control of streams, and the Water Resources Review, a monthly summary of stream-flow and ground-water conditions in this country and Canada was issued. The administration of certain features of permits and licenses of the Federal Power Commission has been continued. Investigations of water problems along the international boundary between the United States and Canada have been continued for the State Department and the International Joint Commission. After the death of A. H. Horton, for many years its Chief, the Division of Power Resources was discontinued as of March 31, 1945, and its functions transferred to the Division of Water Utilization.

CONSERVATION BRANCH

The classification of the public lands of the United States as to mineral and water resources and the supervision of operations for the development of these vital natural resources without waste are functions of the Conservation Branch. This work involves intricate problems of geology, engineering, economics, and administration in complying with legislation enacted by the Congress, which contemplates that these resources shall be developed by private initiative in accordance with wise conservation practices. The activities include field investigations and preparation of reports dealing with water power, fuels, minerals, and chemicals essential to national war and postwar programs.

Classification of Lands

Mineral classification.—The Mineral Classification Division, in response to war-engendered demand for new sources of oil, gas, coal, potassium, and magnesium from the public domain, continued and increased markedly all phases of its service during 1945.

In all, 13,079 cases were acted on during the year, an increase of 20 percent over 1944. Initial or revised definitions of the known geologic structure of 7 producing oil or gas fields were prepared and promulgated; geologic appraisal was made of 80 unit-plan submissions; and 53 special reports were rendered to the General Land Office on new discoveries of oil or gas on or adjacent to Federal lands, including 22 applications for the royalty benefits accorded by the act approved December 24, 1942 (56 Stat. 1080), for the discovery of new oil and gas fields or deposits during the national war emergency.

The Division established during the year a sixth regional field office with a resident geologist in charge at Tulsa, Okla.

Water and power classification.—The work of obtaining basic information concerning the water-power resources and storage possibilities of Federal lands was on projects proposed for development to assist in the prosecution of the war or for postwar construction. Topographic surveys were made of 147 linear miles of streams including 8 dam sites. In cooperation with the Water Resources Branch, supervision of construction and operation was given to 163 power projects under license from the Federal Power Commission, to 212 such projects under permit and grant from the Department of the Interior, and to 157 in cooperation with the Office of Indian Affairs.

Office activity resulted in the addition of 110,278 acres to power-site reserves and the elimination of 7,929 acres, increasing the outstanding reserves in 22 States and Alaska to a net total of 6,774,297 acres; in the publication of maps of 180 miles of stream valley and 18 dam sites; in final action involving hydraulic determination on 267 cases received for report from departmental sources and the Federal Power Commission, and in water-power classification on 1,939 cases, which also involved mineral classification. Reservoir-site reserves in 9 States remain unchanged at 137,172 acres.

Mineral Lease Supervision

Mine supervision.—The Mining Division supervises operations for the discovery and production of coal, potash, phosphate, sodium, silica sand, sulfur, and oil shale on public lands; of gold, silver, mercury, and quartz on various land grants; and of all minerals except oil and gas on tribal and restricted allotted Indian lands. The total output of such minerals from Indian and public land was valued at more than \$66,000,000 during 1945. The Division serves as consultant to the Department of Agriculture on mining leases under the jurisdiction of

that Department and also supervises production of minerals from public lands by the Metals Reserve and the Defense Plant Corporation. The supervisory work involved on June 30, 1945, 572 public-land properties under lease, permit, and license; 235 Indian properties under lease or permit in 14 States and Alaska; and 3 secretarial authorizations in 3 States.

The Division cooperated with the Departments of War, Justice, and Agriculture, other bureaus of the Department of the Interior, the War Production Board, the Reconstruction Finance Corporation, the Defense Plant Corporation, and Smaller War Plants Corporation by furnishing information on potential sources of minerals necessary to the successful prosecution of the war.

The production of potash was maintained at a high level during the year, with continued diminution of known high-grade ore reserves on public lands in New Mexico. Test holes drilled cooperatively by the Geological Survey and the Bureau of Mines in and adjacent to the potash reserve created by Executive Order 6797 indicated that the reserve contains several million tons of high-grade potash ore. Prospect drilling by the three large operating companies in advance of mine development disclosed additional high-grade reserves.

The increasing demand for fertilizer materials, because of the need for increased food production, has intensified interest in the development of phosphate deposits in the western States. During the year one phosphate lease was modified to include additional land and production was begun under two leases previously issued. The suspension of action on the issuance of phosphate leases by Departmental Order 1294, of July 2, 1938, except in particularly meritorious cases, continues in force.

Most of the sodium from the public domain is produced from Searles Lake, Calif., the plants there being operated at maximum capacity, with available labor, to meet the war-induced demand for chemical products used in the manufacture of war materials, such as percussion caps, bombs, flares, shells, smokeless powder, synthetic rubber, armor plate, range finders, bomb sights, and fire-control apparatus. Sodium products are used also as food preservers, water softeners, and refining processes.

Oil and gas supervision.—The Oil and Gas Leasing Division supervises operations for the discovery and production of petroleum, natural gas, natural gasoline, and butane occurring in public lands of the United States, in naval petroleum reserves, and in all Indian lands subject to departmental jurisdiction, both tribal and allotted, except those of the Osage Nation, in Oklahoma. During the year these duties were accomplished through 18 field offices and suboffices in California, Colorado, Montana, New Mexico, Oklahoma, Utah, and Wyoming.

Four special-study groups were engaged in investigations to aid in secondary recovery operations and other engineering practices necessary to conservation and maximum ultimate recovery of petroleum from public-land leases. During the year studies were completed and preliminary reports prepared on the Buena Vista Front Pool, Calif.; Square Lake and Grayburg fields, N. Mex.; Cole Creek and South Oregon Basin fields, Wyo. A limited supply of mimeographed copies of reports for the Hogshooter and Nowata-Claggett fields in Oklahoma was prepared for public distribution.

On public lands, 7,041 oil and gas properties were under supervision at the end of the fiscal year, aggregating 4,596,053 acres in 20 States and Alaska, an increase of 32 percent in the number of properties and nearly 48 percent in the acreage under supervision at the close of the previous fiscal year.

Drilling on public lands during the year included the spudding of 566 wells and the completion of 626 wells, 440 of which were productive of oil and gas and 186 of which were barren. In all, 11,460 public-land wells, including 6,289 capable of oil and gas production, were under supervision on June 30, 1945. The production from petroleum deposits of the public lands during 1945 was somewhat more than in 1944.

The efforts to fulfill the need for new petroleum reserves were reflected in an increase of 4 in the number of new unit plans approved during the year, the total being 22; 11 unit plans were terminated because all rights thereunder were relinquished or abandoned, leaving 121 approved plans covering 1,421,487 acres outstanding on June 30, 1945. Production under approved unit agreements constituted about 54 percent of the petroleum obtained from public lands during the year, 71 percent of the natural gas, and 80 percent of the gasoline and butane. In addition, two Indian-land unit agreements covering a gross area of 11,685 acres were in effect during the year.

On Indian lands the work of oil and gas lease supervision involved 4,786 leaseholds in 9 States, containing at the end of the year a total of 7,569 wells, 3,987 of which were productive of oil or gas and 146 of which had been completed during the year. Notable increases in production of natural gas and crude oil were reported from the Chickasaw and Choctaw lands in Oklahoma, from the Blackfeet lands in Montana, and from the Shoshone lands in Wyoming. Rentals, royalties, and bonuses accrued from Indian-land operations during the fiscal year are estimated to aggregate \$3,073,728.

On behalf of the Navy Department supervision was continued over operations for the production of oil, gas, gasoline, and butane from 31 properties under lease in Naval Petroleum Reserves Nos. 1 and 2 in California. Production from 312 active wells on this reserve aggregated 3,284,300 barrels of petroleum, 3,584,300,000 cubic feet of

natural gas, and 8,343,300 gallons of natural gasoline and butane, having an aggregate royalty value of \$600,200.

WORK ON PUBLICATIONS

Texts.—The publications in the regular series (professional papers, bulletins, and water-supply papers) issued during the year numbered 38, a decrease from the 49 of last year, again reflecting adjustment to a war-curtailed publication schedule. These publications together with 18 miscellaneous publications issued during the year comprise 7,289 printed pages. Work by the editors included: 6,671 pages of manuscript edited and prepared for printing; 431 galley proofs and 2,955 page proofs revised and returned; indexes prepared for 4 publications, covering 632 pages and consisting of 593 index entries. Copy prepared for mimeographing included 92 press releases, consisting of 147 pages, and 76 pages of miscellaneous material.

Illustrations.—Seventeen reports, containing 403 illustrations, were transmitted to the printer. In addition, 37 maps and sections illustrating deposits of essential strategic minerals were prepared for preliminary release, and 210 proofs and 39 edition prints were examined.

Geologic map editing.—Sixty-five geologic maps and diagrams were completed by the new Section of Geologic Cartography, including multicolor maps of the Comstock Lode district, Nev., and the Gouverneur talc deposits in New York. Copy for the geologic map of Idaho was nearly completed, and the Hollidaysburg-Huntingdon folio was finished. Progress was made on the geologic map of the District of Columbia and vicinity and on the preparation of indexes showing published geologic information on each of the 48 States.

In addition to the maps prepared by the Section of Geologic Cartography, the geologic map editor examined and checked 63 maps and figures drafted by the Section of Illustrations for water-supply papers and 70 maps and figures for professional papers and bulletins.

Distribution.—The Division of Distribution received during the year a total of 852 publications, comprising 40 new books and pamphlets and one special reprint of Water-Supply Paper 888 for official use only, 35 preliminary maps and 9 preliminary charts in the oil and gas and war-minerals investigation series, 253 new or revised topographic and other maps, of which 30 maps were first published as preliminary editions, one Tennessee Valley Authority map with contours, 474 reprinted topographic and other maps, and 9 reprinted advance sheets. The total units of all publications received numbered 74,226 books and pamphlets, plus 1,000 copies of the reprint, 14,500 copies of revised index maps, and 2,308,005 topographic and other maps, a grand total of 2,396,731. The division distributed 72,154 books and pamphlets, 722 geologic folios, and 1,155,548 maps,

making a grand total of 1,228,424, of which 678 folios and 1,001,194 maps were sold. The net proceeds (gross collections less copying fees and amounts refunded) from the sales of publications were \$56,608.20, including \$56,425 for topographic and geologic maps and \$183.20 for geologic folios. In addition to this, \$20,923.59 was repaid by other establishments of the Federal Government at whose request maps or folios were furnished. The total net receipts, therefore, were \$77,-531.79.

Division of map reproduction.—During the year 80 newly engraved topographic maps, 161 multicolor topographic maps, 44 geologic preliminary maps, and 12 special maps were printed, making a total of 297 new maps printed and delivered. Reprint editions of 393 engraved topographic maps, 8 multicolor maps, and 73 photolithographed State geologic and preliminary and other maps were printed and delivered. Of new and reprinted maps, 771 different editions, amounting to 2,322,779 copies, were delivered. A large amount of work was done for 69 other units of the Government, including branches of the Geological Survey and States, and the charges for it amounted to about \$177,000, for which the appropriation for engraving and printing geologic and topographic maps was reimbursed. Transfer impressions and velox prints, numbering 61, were made during the year, and the amount turned over to miscellaneous receipts was \$1,129.10. Topographic maps and contract and miscellaneous work of all kinds, totaling 4,776,814 copies, were printed and delivered. The photographic laboratory made 9,647 negatives, 28,673 prints, 3,872 photolith press plates, 238 intaglio etchings, 2 celluloid transfers, and mounted 1,448 prints.

LIBRARY

The work of the library during the year was again directed principally toward providing reference material for the war activities of the Geological Survey. The Military Geology unit with a corps of bibliographic aids used the library to the maximum in making a compilation of strategic engineering studies. The total number of readers was 12,000. The total circulation of books, pamphlets, periodicals, and maps was 65,600. Acquisitions of books and serial parts again declined in number to 10,806. More than 6,000 maps were acquired, approximately 5,000 from the Army Map Service. A number of German scientific books and periodicals, chiefly in the fields of physics and chemistry, have been purchased in reproduction through the authority of the Alien Property Custodian. The lesser number of geologic items on the market enabled the library to expend a larger portion of its book funds in building up its collection in chemistry and physics, which was inadequate in many phases of recent research touching on the work of the Geological Survey.

Other purchases reflect the emphasis on engineering geology. The Bibliography of North American Geology, 1942-43 is in press.

FIELD EQUIPMENT

Among the more unusual devices made during the past year by the Division of Field Equipment are the following:

A graph subdivider, which is used to convert graphical records of the gage heights of rivers into figures representing the daily mean discharge of such rivers.

A tick graduator, which is used for precisely dividing the distances between degree lines on map grids into 60 equal parts representing minutes and cutting the graduations ("ticks") through the photographic emulsion on glass plates.

An attachment for aerial continuous strip cameras whereby distortions in the photograph such as caused by the tilting and dipping of the airplane are largely eliminated.

A stereo plotter, which is used to plot onto maps contour lines derived by the floating dot method from vertical aerial photographs.

The devices are offering many advantages in their respective fields of stream gaging, mapping, and geologic investigations.

FUNDS

During the fiscal year 1945 there was available for expenditures under the direction of the Geological Survey a total of \$12,598,873. Of this amount \$6,364,160 was appropriated directly to the Geological Survey, and \$6,234,713 was made available by other Federal agencies and by States and their political subdivisions. In addition, \$11,800 was allotted from the appropriation for contingent expenses of the Department of the Interior for miscellaneous supplies.

Funds available to the Geological Survey in 1945 from all sources, general administrative salaries:

Interior Department Appropriation Act.....		\$240, 490
Topographic surveys:		
Interior Department Appropriation Act.....	\$1, 180, 360	
States, counties, and municipalities.....	330, 575	
War Department.....	1, 149, 960	
Tennessee Valley Authority.....	76, 000	
Public Roads Administration.....	57, 487	
Miscellaneous repay.....	209, 992	
		3, 004, 374
Geologic surveys:		
Interior Department Appropriation Act.....	1, 337, 970	
States, counties, and municipalities.....	65, 000	
Bureau of Mines.....	317, 000	
Board of Foreign Economic Administration.....	64, 000	
War Department.....	410, 000	
Miscellaneous repay.....	9, 026	
		2, 202, 996

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Strategic and critical minerals:

Interior Department Appropriation Act.....	\$665, 000
States, counties, and municipalities.....	7, 000
State Department (for work in other American Republics).....	90, 500
Miscellaneous repay.....	1, 614

\$764, 114

Mineral resources of Alaska:

Interior Department Appropriation Act.....	177, 000
Navy Department.....	50, 000
War Department.....	600, 000
Miscellaneous repay.....	3, 374

830, 374

Gaging streams:

Interior Department Appropriation Act.....	1, 510, 000
First Supplemental Appropriation Act.....	80, 000
States, counties, and municipalities.....	1, 269, 370
Permittees and licensees of Federal Power Commission.....	35, 865

Department of the Interior:

Bonneville Power Administration.....	5, 600
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Solid Fuels Administration for War

C. J. POTTER, *Deputy Administrator*



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 2. various methods which have been proposed for the determination of
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including snowstorms, floods, fires, sudden changes in war needs and many other developments. But the over-all job of planning made it possible for such problems to be met with a minimum adverse effect on the general fuel supply and its distribution.

Even with many hard-won fuel battles of the war safely behind us, June 30, 1945, a difficult fuel situation still existed. Germany's defeat did not diminish requirements appreciably, and the mines, which had been steadily losing manpower to the armed forces, to other industries and because of natural attrition, no longer had sufficient men to produce all the coal needed. Stockpiles, built up to unprecedented heights under Government leadership early in the war, no longer were adequate to tide the Nation over a serious production deficit.

In the United States, the solid fuels issue lay not in the lack of coal underground but principally in the steady loss of mine manpower. The heavy wartime drain, however, did accelerate depletion of the reserves of high-grade metallurgical and special-purpose coals, leaving nearer the time when the problem of their exhaustion must be met.

SOLID FUELS REQUIREMENTS

Because of the heavy pressure of war industrial demands and the increased financial ability of the domestic consumer to buy more fuel, soft coal requirements reached an all time peak of 626,000,000 tons during the fuel year which ended on March 31, 1945. This far outstripped peak requirements of World War I by about 73,000,000 tons, although the situation is not entirely comparable as an index of recent wartime fuel needs, due to the great increase in fuel consumption and the greater availability of other fuels during World War II.

Requirement figures for the new fuel year, beginning April 1, 1945, were initially placed at 600,000,000 tons, assuming that the war with Japan continued, reflecting anticipation of some decrease in industrial consumption under that of the 1944-45 fuel year and a 20 per cent curtailment in the consumption of the eastern (districts 1, 2, 3, 4, 7, 8, and 13) coals by households and other domestic users.

The fall of Germany caused little further downward revision of these estimates because war production needs for the defeat of Japan continued high.

The war caused shifts on the fuel front which made it necessary for the anthracite industry to take on an unexpected burden of a large number of new consumers when supplies of fuel oil, wood, and gas became short. Total hard coal requirements were estimated at 66,100,000 tons for the 1944-45 fuel year and the figure was increased to 67,000,000 tons for the 1945-46 fuel year. (The 67,000,000 tons

production would be required to supply the needed volume of domestic sizes.)

Byproduct coke requirements were high in the early part of the past fiscal year because of the continuing demands for manufacturing pig iron and steel. This placed a burden on anthracite in certain areas.

Industrial requirements decreased, however, from September 1944 to May 1945, due to general expectations of an early end to the war in Europe.

During the fuel year which ended March 31, 1945, approximately 60,372,821 tons of byproduct coke were shipped to industries requiring that fuel. The movement of byproduct coke to domestic consumers was estimated at 6,407,900 tons. Reclaimed beehive coke provided as an alternative fuel for consumers of scarce solid fuels during the year totaled 713,000 tons, and rescreened byproduct coke, 147,000 tons.

PRODUCTION—MANPOWER SITUATION

Bituminous coal production in the calendar year 1944 was the largest of all time, totaling 620,000,000 tons. Production in the fuel year ending March 31, 1945, dropped to 610,000,000 tons, or about 10,000,000 tons below requirements, and estimates for the 1945-46 fuel year point to a maximum output of some 575,000,000 tons.

Production of anthracite in the 1944-45 fuel year totaled approximately 61,287,000 tons. Indications are that hard coal production in the 1945-46 fuel year will not exceed 55,000,000 tons.

The coal production problem, reduced to its simplest terms, was inadequate manpower aggravated by strikes. On April 1, 1945, an estimated 378,000 workers were employed at bituminous mines, the lowest figure in 43 years. Anthracite employment was put at 72,000, the lowest since the early days of that industry.

Trends at the start of the 1945-46 fuel year indicated that bituminous mine manpower would decrease an additional 19,000 before the end of that year, due largely to accidents, deaths, and retirements. In the anthracite mines, a further net loss of some 3,000 workers was expected.

The Solid Fuels Administration appealed vigorously but unsuccessfully for the release of adequate manpower from 30,000 younger mine workers in military service. By agreement with the Selective Service System, draft deferments were obtained for some 27,000 mine workers during the past fiscal year.

Recurrent strikes throughout much of the 1944-45 fuel year further retarded coal production. A strike which started July 3, 1944, at the anthracite mining properties of the Philadelphia and Reading Coal & Iron Co., near Shenandoah, Pa., cost consumers 500,000 tons of hard coal before it was terminated on August 23 after the Government took

possession. These properties were operated under Government possession until April 18, 1945, when they were returned to the owners.

Fostering increased mine output by every possible means, the Solid Fuels Administration for War assisted the industry in carrying out various incentive programs. In addition the Administration assisted mine operators in obtaining new equipment to replace worn out tools and machinery. The Administration aided in having roads constructed to new mine pits and stripping operations and helped retail dealers obtain tires for their trucks. Successful representations were made to the Office of Price Administration to obtain larger supplies of meat for mine workers, many of whom complained that they were unable to continue their work without increased rations.

COOPERATION IN LABOR MATTERS

Production in bituminous coal mines suffered heavily in August and September 1944 because of a wave of so-called "supervisory" employee strikes. These started in the northern Appalachian mining districts and spread south, affecting principally the mines producing vitally needed special-purpose coals. In order to restore production, it was necessary for the Government to take possession of 72 mining properties, which remained under its control until February 24, 1945.

In the spring of 1945, the Secretary of the Interior, at the direction of the President, took possession of 272 soft coal operations and 354 anthracite companies to minimize losses of production due to strikes attending a break-down in wage negotiations. Possession of the mines was administered by the Solid Fuels Administrator for War until after the wage controversies were settled. When anthracite wage negotiations became stalemated, Secretary Ickes called the opposing parties together and suggested a basis for further consultations which resulted in an agreement. With these matters settled, all but a small number of mines that had been taken over by the Government subsequently were returned to their owners.

Estimated losses of potential production due directly to strikes in the 1944-45 fuel year were 13,835,000 tons of bituminous coal and 5,098,000 tons of anthracite.

DISTRIBUTION OF SOLID FUELS

With coal supplies falling behind requirements throughout the fiscal year, it was necessary for the Solid Fuels Administration for War to exercise controls over distribution in order to prevent interruption of vital war industries and hardship to civilians.

On August 1, 1944, retail deliveries of scarce Southern Appalachian bituminous coals were limited to 90 percent of 1943-44 receipts. A

regulation was issued requiring shippers of scarce Southern Appalachian coals to maintain three categories of shipping preferences. The shippers were ordered to fill first the needs for byproduct and special purpose coals, then to fulfill commitments on coal ordered for movement by water during the Great Lakes navigation season to dock operators. Third preference was given to orders from retail dealers.

That regulation also established three "consumer areas," in which priorities were given for shipping the scarce Southern Appalachian coals to retail dealers. Southeastern States which had no alternative source of solid fuels were given first priority. The second area embraced regions receiving their coal by Great Lakes vessels. Midwestern States which have alternative fuels comprised the third consumer area.

The shortage of high grade Appalachian bituminous coals became so acute by August 1944 that the Solid Fuels Administration for War, in order to protect wartime steel production, ordered the diversion of some 1,680,000 tons over a period of several months from industrial plants using it for generating steam to steel and coking plants.

Heavy inroads on Midwestern bituminous coal, coupled with production difficulties occasioned by bad weather, compelled action in December to restrict shipments of fresh-mined coal by producers to industrial consumers in proportion to their stock piles. Many industries which had comparatively large stocks on hand were obliged, therefore, to withdraw from those stocks for day-to-day burning needs to provide more new-mined coal for others whose stocks were being depleted too rapidly for safety.

In January 1945, extremely heavy snowfall hampered rail transportation in many eastern States, making temporary railroad embargoes necessary. Producers in Southern Appalachian mining districts were requested not to ship coal west of Pittsburgh and north of Central Ohio, Indiana, and Illinois during the embargoes because of car shortages. As an emergency measure, retail deliveries also were limited for a short time and diversions of coal in transit were made in order to supply dealers whose yards were nearly empty. The cooperation of local authorities in many cities and towns was obtained in assuring that every one had at least enough solid fuel to prevent acute suffering.

Equitable distribution of anthracite, the primary market for which is among household consumers in the Northeastern and Middle Atlantic States, was carried out successfully in the past fiscal year despite the serious production deficit and numerous delivery handicaps.

A critical emergency was created in fuel distribution by the series of heavy snowstorms which formed ice in many northeastern rail terminals, freezing cars to the rails and coal in the cars. For a time shipping and retail delivering in northern, central, and western New York State was completely disrupted.

At the start of the 1944-45 fuel year, distribution of hard coal from producers and wholesalers was planned on a basis of 90 percent of adjusted 1942-43 base period tonnages. The deficit of production under requirements, however, exceeded earlier estimates, and in August shipments by producers and wholesalers to retail dealers were cut to 87½ percent. In February and March of the fuel year it was necessary to reduce this figure to 80 percent.

Adhering to principles adopted at the beginning of anthracite distribution controls, the Solid Fuels Administration for War continued to make upward adjustments of dealer quotas wherever this was made necessary by population increases, conversions from other fuels and similar changes in requirements.

The Solid Fuels Administration for War assisted the anthracite industry in disposing of some of the excess fine sizes of hard coal which were not suitable for home heating, through the development of new markets. Encouragement was given to manufacturers of processed fuel to use these small sizes and some were shipped abroad as a substitute for fuels normally used.

In the distribution of anthracite in sizes suitable for heating, the Administration gave a preference to poultry brooders and hatcheries because of their essentiality as wartime food producers.

Anthracite production during the 6 months preceding the end of the 1945-46 fuel year fell 19 percent below that of the comparable period of the previous year, and at this time the prospect is that the industry's output will be substantially short of requirements.

Distribution of coke during the past fiscal year was a problem the solution of which lay chiefly in supplying coke plants with adequate tonnages of suitable coals. During the last 3 months of the fiscal year—from April 1 to July 1945—it was necessary to divert byproduct coke from the domestic market to meet the requirements of industrial users. This demand, however, tapered off in the latter part of June, releasing additional supplies for domestic consumption.

Throughout the fiscal year the Solid Fuels Administration for War continuously urged persons using anthracite for heating purposes to accept deliveries of reclaimed coke to supplement short supplies of their customary fuel. Wherever this advice was followed, purchasers were able to stretch their heating fuels farther during the winter months.

Special problems arising in connection with the distribution of solid fuels included providing adequate fuel supplies for regions which normally receive their winter's supplies of coal by water over the Great Lakes shipping routes. Slightly more than 58,000,000 tons of coal were forwarded from lower lake ports during the 1944 navigation season—an all-time record achieved under a regulation of the Solid Fuels Administration for War requiring uniform monthly shipments.

Taking cognizance of the prospect that production during 1945 would continue to decrease, the Solid Fuels Administration for War directed Great Lakes dock operators to inform their suppliers by February 16 of the amounts, grades, and sizes they would require for a year from May 15, 1945. At the same time retail dealers were ordered to supply the dock operators with detailed information as to the needs of their industrial customers. This information formed the basis whereby producers could gauge their shipments during the season of navigation.

Industrial stockpiles were increased during the summer and fall of 1944 from a low of 50,513,000 tons on May 1, to a high of 65,074,000 tons on November 1, but mine manpower shortages and strikes made it impossible to build them up sufficiently to offset the additional winter consumption requirements. From November until the end of the fuel year on March 31, 1945, stockpiles declined again to 45,495,000 tons. This decline continued until May 1, 1945, when stockpiles reached their lowest point of the war—43,793,000 tons. During the remainder of the spring they began to rise again, reaching 47,718,000 tons by the end of the fiscal year.

DISTRIBUTION PROGRAM FOR 1945-46

Serious shortages of solid fuels in prospect early in 1945 compelled thorough revision of the Administration's distribution program. One of the regulations drafted for the 1945-46 fuel year laid the basis for allocations of special purpose coals, protecting them against uses which would tend to handicap the national war effort.

Other outstanding features of the 1945-46 distribution program included: (1) Limitation of dealer quotas for the scarce eastern solid fuels to 80 percent of the dealer's receipts in a base year period; (2) limitation of retail deliveries of anthracite, eastern-mined bituminous coal, coke, and packaged fuels to 80 percent of the consumer's normal annual requirements; (3) giving a third priority on soft coal to be moved to the Great Lakes and stipulating that the lake movement was to be completed by November 17, 1945; (4) continuation of tight controls on industrial coal distribution and stock piling; (5) requiring that "over-the-road" anthracite truckers secure SFAW licenses to assure a more equitable distribution by truck and by rail; and (6) encouraging spring and summer storage of solid fuels by as many consumers as possible under conditions of short supply.

To assure the widest possible spread of solid fuels during the 1945-46 fuel year, the new regulation required consumers using them for heat in all States east of the Mississippi and in certain areas west of that river to file "consumer declarations" with their retail dealers to show how many tons their premises normally required for a year.

A similar method of retail distribution already had been in use by anthracite consumers and had operated successfully in lieu of coupon rationing. Solid fuels consumers who filed the declaration were limited to 80 percent of their normal annual requirements of the scarcer kinds of fuel. Toward the end of the fiscal year this limitation was removed with respect to midwestern-mined soft coal.

Local advisory committees were continued in all States in which fuel was scarce to assist domestic consumers and retail dealers with respect to fuel problems. Provisions were made in regulations whereby the so-called "orphan" consumers were helped to get coal. (These were consumers who were either new in a community or for some other reason had no regular retail supplier.)

WAGE AND PRICE STABILIZATION

Consistent with the responsibility of the Solid Fuels Administration for War to maintain production at the highest possible level within the established stabilization policy, the agency frequently recommended to the Office of Price Administration the establishment of prices for solid fuels that would encourage or protect coal output. In making such recommendations, the Administration reviewed in detail the cost and realization figures where the application for price adjustment affected a complete production district, a production subdistrict, or any considerable group of mines.

On general price revisions or on those affecting mines of large production, the Solid Fuels Administration for War made recommendations to the Director of Economic Stabilization which supplied him with information useful in passing upon recommendations of the Office of Price Administration. Also, in connection with wage stabilization, the Administration furnished data and advice to the War Labor Board.

CONSERVATION OF FUELS

Fuel conservation became an important wartime measure during the fuel year 1944-45. The reduction in supplies made it necessary for householders and industries alike to take vigorous steps to avert fuel waste. It was necessary to convince the public of the need to save fuel through programs of education in methods of accomplishing fuel savings.

Mass educational and promotional procedures were used to obtain the cooperation of the household consumers, while the industrial activities largely consisted of engineering advice, carried on through the National Fuel Efficiency program of the Bureau of Mines.

The part of the program pertaining to household consumers was carried on directly by the Solid Fuels Administration for War, with the

help of State governments in areas where fuel was most critically short, and with the aid of the Office of War Information. The Governors of 25 States in the critical areas appointed State Fuel Conservation Directors who cooperated with the Federal Government in the issuance of information to promote fuel savings. Basic information, and a small amount of educational materials were supplied the states by the Solid Fuels Administration for War, which coordinated State and Federal activities in connection with this program. With the cooperation of the Office of War Information, the Solid Fuels Administration for War carried on a program of public education, employing such media as radio, press, motion pictures, posters, and circulars.

The funds appropriated for public informational activities were exceedingly inadequate as compared to the size and importance of the task, making it necessary for the Solid Fuels Administration for War to appeal to and depend largely upon the expenditures of business organizations and other interested groups. The radio industry and its advertisers devoted broadcasting time freely to fuel messages. Government advertising material was placed in the hands of private business organizations and associations which reproduced and distributed it, or sponsored and paid for its use as commercial advertising by the radio and press.

During the warm months, steps were taken to encourage the public to prepare for winter by ordering and storing whatever fuel was available, cleaning and repairing heating equipment, insulating and otherwise making homes and other buildings "heat tight." During the heating season, more direct conservation measures such as delaying the starting of fires in the fall and extinguishing them early in the spring, preventing overheating, or inefficient furnace firing, were advocated.

COMPLIANCE WITH REGULATIONS

Considerable credit for the generally excellent compliance with wartime fuel regulations is due to the coal industry for its cooperation. The job of distributing fuel fairly could not have been done, however, without the compliance activities of the Administration, important among which were the efforts taken to explain to the trade the regulations and directions by which solid fuels were distributed, their purposes and necessity.

Violations were relatively few, considering the many thousands of producers, distributors, dealers, truckers and consumers affected. In most cases, maldistribution resulting from detected violations was corrected by adjustment of shipping schedules, and in some instances, by the elimination of untrustworthy channels of distribution.

Because there was sufficient coal to supply household consumers with a reduced percentage of their normal requirements, it fell upon Solid Fuels Administration for War to see that they received their full share in tons of the available supply, and that the limited supply was not adversely affected by deliveries of coals containing excessive ash. It was necessary to suspend the operation of some 20 anthracite mines for various periods because fuel containing excessive ash was shipped from them. Violations of all types averaged about 100 per month.¹

¹ The war had ended by the time this report was written. The solid fuels outlook for the 1945-46 fuel year was still clouded, however, by the delayed return of manpower to the mines from the armed services and from employment in war industries in time to make possible the production of adequate coal for all purposes.

In general, the supply of the lower grades of coal appeared adequate, but the Nation was still confronted with a serious shortage of the higher grade bituminous coals produced in the east and of anthracite. It unquestionably will be necessary to continue exercising certain controls over the distribution of solid fuels throughout the 1945-46 fuel year, and for the public to accept alternative fuels wherever preferred types or sizes are not available.

Petroleum Conservation Division

E. B. SWANSON, *Acting Director*



THE Connally "Hot Oil" Act, approved February 22, 1935, delegates to the President prescribed powers "to regulate interstate and foreign commerce in petroleum and its products by prohibiting the shipment in such commerce of petroleum or products moved in excess of amounts allowed by State law and for other purposes."

Acting through the Secretary of the Interior as the designated agent of the President, the Petroleum Conservation Division was established to assist in the prescribed administration of the act, to cooperate with oil and gas producing states in the prevention of waste and the adoption of uniform oil and gas conservation laws, and to keep informed as to the movement in interstate commerce of petroleum and its products with respect to its parity between supply and consumptive demand.

FEDERAL PETROLEUM BOARD

The Federal Petroleum Board with its head office in Kilgore, Tex., and field offices at Lafayette, La.; Corpus Christi, Houston, and Midland, Tex., administers the regulations prescribed under the Connally Act. While the act is applicable to any State having an oil proration law, the supervisory operations of the Federal Petroleum Board are now confined to 106 counties in Texas, two producing counties of New Mexico, and the entire State of Louisiana. Within this area, monthly production reports are not required for "stripper" fields. Eliminating these, the designated area includes 476 oil fields, 19,323 wells, 78 refineries, and 129 gasoline plants. Daily production averages 2,110,604 barrels of oil and 132,599 barrels of casinghead gasoline and other liquids. This is 75.37 percent of the total output for New Mexico, Texas, and Louisiana or 41.96 percent of national output. The refineries process a daily average of 1,679,189 barrels of products. The daily average increase in production, within the designated area, over the fiscal year 1944, is as follows: Barrels of crude oil, 10.2 percent; barrels of petroleum products, 16.1 percent; barrels of casinghead gasoline, 25.6 percent.

Although the Board's area for supervision does not include all territory in which State proration laws are applicable, action can be and is instigated by the Federal Petroleum Board when Connally Act violations occur outside of the supervised area but within a State proration area.

The enforcement of the act and administration of the regulations is essentially a specialized field operation requiring, among other things, routine and special inspections. This function is necessary to maintain effective control over the interstate movement of petroleum and its products. As a result of this control, illegal practices are reduced and a maximum compliance with conservation laws is maintained in oil operations.

Activities of the Federal Petroleum Board have been curtailed by reduction in experienced personnel and by other wartime handicaps. Yet the volume of criminal investigative operations has been maintained at an effective level. Changing economic conditions have reduced the incentive for Connally Act violation and continued supervisory operations have acted as a deterrent. The Board's personnel has been for several months in a position to report on technical and economic conditions within the Board's area.

During the fiscal year J. W. Steele retired as chairman, and member Ray O. Armstrong was appointed chairman.

As of July 1, 1944, there were seven Connally Act cases which had been referred to the Attorney General pending action by the Department of Justice and six major investigations in progress. Evidence had been developed in the six investigations to such an extent as to allow for allegations of Connally Act violation. Of these 13 cases, 4 were prosecuted successfully, and \$12,100 in fines collected. Indictments have been secured in two other cases and they are now ready for trial. The two indictments name two corporations and 21 persons. Civil action involved in three cases has been conducted effectively in the Government's interest and criminal action against respondents has been started. One of the cases in investigative status at the beginning of the fiscal year has been compiled and presented to the Department of Justice, another will be offered shortly. Two of the cases in an investigative status have been closed by administrative action because it was found that prosecution would not be advisable or justified. The thirteenth case remains pending in the Department where it has been for several years awaiting apprehension of the indicted.

On December 1, 1944, by Order No. 2012, the Secretary established a Departmental Petroleum Committee, which consists of the Director of the Geological Survey, Director of the Bureau of Mines, Assistant Commissioner of the General Land Office, Assistant Solicitor and the Director of the Petroleum Conservation Division, as Chairman.

The Committee reviews and coordinates the petroleum work of the several agencies of the Department and makes recommendations to the Secretary as to changes which may be necessary or desirable to increase the effectiveness of the work.

Comparative analyses of production data by fiscal years

	Crude production		Percentags of production to total in United States
	United States	Reported to Federal Petroleum Board	
	<i>Barrels</i>	<i>Barrels</i>	
Fiscal year 1942.....	1, 409, 015, 000	547, 627, 750	38. 9
Fiscal year 1943.....	1, 418, 609, 000	550, 412, 012	38. 8
Fiscal year 1944.....	1, 559, 141, 000	710, 014, 166	44. 4
Fiscal year 1945.....	1, 721, 956, 559	770, 370, 489	44. 7

General Land Office

FRED W. JOHNSON, *Commissioner*



POSTWAR administration of public lands roughly estimated as representing nearly a quarter-billion dollars' worth of real estate owned by the American people, is the paramount task confronting the General Land Office at the close of the 1945 fiscal year. Taking into account the intangible assets inherent in the 778 million acres of the public domain in the United States and Alaska and the mineral deposits and other resources in the land, this property is an important factor in national economic advancement during the reconversion period. Its continued management under progressive conservation policies for use and development with an eye to the requirements of the future, is essential. In no other way can the domestic demands for maximum beneficial use of the land and resources of the public domain, adequately be met.

Already, the trend of scientific research has pointed the way to new fields of usefulness for the public domain, broadening the scope of activities in the development of resources beneath the surface and expanding the opportunities for utilization of the land itself. The wider horizons for mineral uses revealed by the discovery and development of atomic energy, the steadily mounting requirements for lumber and other forest products to repair the ravages of war, and the growing demands from ex-servicemen for land settlement opportunities serve to illustrate the trend toward more extensive usage in the years immediately ahead.

Obviously, this contribution to future economic advancement cannot help but enhance the value to the American people of their public domain. However, it will also bring a corresponding increase in the responsibilities facing the General Land Office. New methods and new laws must be provided with which to carry out these new tasks which, in effect, mark the beginning of a new era in national land administration.

ESTIMATE OF VALUE

There is a wide range of fluctuation in the evaluation of land. Current conditions and demands can change such calculations overnight. Who, for instance, can predict with accuracy the worth of areas destined to become homes of future settlers in Alaska, or estimate the ultimate monetary value of mineral-bearing lands? Nevertheless, some idea of the value of the public land is essential to the determination of its worth as a national asset of the United States.

It has been conservatively estimated that the public lands of the United States on the continent and in Alaska represent real estate values aggregating \$235,000,000, of which \$125,000,000 worth is located in the United States. Roughly divided, the assets comprise forest lands and woodlands worth \$160,000,000, grazing lands whose value is conservatively placed at \$30,000,000, and other lands including barren areas as well as areas devoted to special use, valued at \$45,000,000. In addition to this conservative evaluation of the land, technical services rendered by the General Land Office to the public and to agencies of both Federal and State governments constitute other less tangible factors whose value conservatively is estimated to bring the total worth of the people's assets in this real estate to \$250,000,000.

NEW PROBLEMS

Land administration experiences in connection with the prosecution of the war have sharply accentuated the pattern for efficient management of the public domain in time of peace. At the close of the 1945 fiscal year, definite alterations in Federal law and in procedures of the General Land Office were revealed as imperatively needed to bring about that efficiency to which the public is entitled and without which the maximum beneficial use of the national lands and their resources cannot be assured. Some of these needs long had been recognized, but their accomplishment was held in abeyance for the duration of the war. Today, freed from the restrictions arising from the necessity for emergency military action, these problems await solution:

1. Rejuvenation of our Federal mining laws is essential. Mechanized warfare has demonstrated that minerals are indispensable in modern war; under present statutes, no method exists for securing to the United States the utmost advantages from the development of such resources on lands under its control. No real mining conservation, a vital factor in the postwar economy, can be brought about without Federal law granting authority for the United States to supervise the minerals which it owns. Except for statutes governing the development of the fuel and fertilizer minerals in the public lands,

no such authority exists at present. A general leasing system applicable to all minerals would provide the Government with not only the power to conserve but the opportunity to catalog and classify its natural assets to insure their maximum beneficial use during the reconversion period.

2. Legislation is needed to extend the salutary provisions of the present mineral leasing law to lands acquired by the Government, as well as to the original public domain. Specifically, lands acquired by Federal agencies under the National Industrial Recovery Act, the Bankhead-Jones Farm Tenant Act and various relief appropriations and rehabilitation acts, together with the public lands, constitute a veritable storehouse of essential minerals. Without the enactment of new laws, the United States may not catalog and in cooperation with private initiative develop the resources on these acquired lands through leases based on sound principles of conservation.

3. Another element essential to the successful administration of the public domain, both in relation to mineral resource development and the general management of the Federal estate along conservation lines during the postwar period, is complete, authentic information as to the character and status of the land. At the present time, evidence of the filing of thousands of unpatented mining claims is not made a matter of Federal record, but is solely registered in county recording offices. The enactment of legislation to enable the recording of such evidence in the General Land Office is urgently recommended.

4. Similarly, another of the serious handicaps to proper administration of the nation's assets is the lack of any facilities by which detailed information can be secured concerning the real estate holdings of the various branches of the Federal Government. The establishment within the General Land Office of a centralized, consolidated inventory of all such land records is recommended as a solution of this problem.

5. From time to time, areas of the Federal domain have been withdrawn from general use by the public in order that broader programs of national development might be facilitated. A careful survey of these withdrawals should be undertaken, and a reduction in the size of the areas withdrawn be brought about wherever feasible in the public interest. By this means, portions of the hitherto withdrawn lands may be restored to their public land status and the land and its resources made available for more general utilization in the postwar period.

6. A reexamination of the public lands to discover whether any tracts hitherto overlooked may be suitable for homestead use by veterans or the general public, is suggested as an appropriate part of

any program for the maximum beneficial use of the natural resources of the Nation.

7. Similarly, a thoroughgoing study of the statutes and administrative procedures for homesteading on the public domain should be undertaken with a view of extending all possible assistance in the placement of returned veterans upon the land.

8. Greater speed and flexibility in the solution of all factors in the veterans' homestead problem should be facilitated through decentralization of administrative operations made possible by additional legislative authority and funds.

9. Many of the 5,000 public land laws under which administration of the public domain is carried on by the General Land Office were enacted more than a half-century ago, and many others have reached a stage of obsolescence incompatible with the requirements of efficient management of the nation's real estate assets during the years immediately ahead. A survey of the Federal land laws and a modern streamlining of their provisions should be made as a prime requisite to adequate public land administration.

10. Meantime, maximum use of the public lands and their resources can be enhanced by the enactment of a uniform Federal trespass law which would afford greater protection against the unlawful acquisition and wasteful dissipation of these national assets.

11. War legislation authorizing the disposal by the Government of sand, stone, gravel, vegetation, timber and other forest products on public lands of the United States should be embodied in permanent law, in order that these natural resources may be made available for construction purposes during the postwar period.

12. The development of Alaska through increased land settlement will require the utmost in service and safeguards for the public if economic advancement is to be attained on a permanently stabilized basis. Protection against ill-advised use of the public domain in the Territory, similar to that provided on the mainland through the requirements for classification of land tracts for the best use to which they may be put, would do much to solve this postwar problem. For this reason, the passage of legislation making such classification statutes applicable to the public land in Alaska is urgently recommended.

PLANS FOR THE FUTURE

Full benefit from the use of the public land depends, however, upon much more than mere legislative enactments, important though they may be to the proper administration of the people's quarter-billion dollar estate. It depends also upon a program of utilization based upon a carefully-planned integration of the objectives and operations of the General Land Office.

During the war years, the planning units of the Office facilitated the quick servicing of demands for land and resources required for the

prosecution of the military program. For example, more than 16 million acres of the public domain were made available as sites for camps, gunnery ranges, aviation bombing fields, tank training areas, and other combat training uses. In addition, many secret withdrawals of land were made to assist the Army and Navy in carrying on the war, and several millions of acres were placed in a state of reserve to permit the untrammelled development for war purposes of the petroleum and other mineral resources in the areas. At the same time, the activities of trained investigators and cadastral engineers and other experts in land identification, classification and management were centered almost entirely upon war-connected tasks, ranging from the examination of thousands of mining claims to the segregation of areas in Arizona, New Mexico and other States for use in experimentation and in the development of the atomic bomb.

Never before in history had the public lands under the jurisdiction of the General Land Office been called upon to provide such an abundant supply of natural resources for military purposes as in the period of World War II which drew near to a close with the end of the 1945 fiscal year.

Most of this land, like the manpower of the nation which entered the armed forces, is scheduled to return to its former "civilian" status after the need for military use has passed. The orders providing for the "enlistment" of the tracts for service in the war stipulate their eventual return to the public domain. The "discharge processing" and subsequent administration under national conservation of these lands is one of the reconversion tasks confronting the General Land Office in the immediate future.

Land Settlement Opportunities

The end of the war has centered the thoughts of many American servicemen and servicewomen upon the prospects for establishing a permanent home upon the public lands of the United States. Visualizing broad opportunities for settlement such as existed in the earlier stages of American history, thousands of members of the armed forces turned to the General Land Office during the last fiscal year for information and guidance in matters connected with the Federal homestead laws. A special leaflet, dealing in terse, question-and-answer form with the problems of homesteading on land in continental United States, was prepared for the benefit of the men and women in the military service, and distribution of other informational material dealing with the public lands both on the mainland and in Alaska was stepped up in response to popular demand.

While prepared to render all possible assistance in the solution of land settlement problems for both military personnel and civilians, attention is called by the General Land Office to the fact that, since homesteading as popularly understood first was set under way by

President Abraham Lincoln 83 years ago, good farm land upon which an agricultural living can be made as required by the homestead law is scarce on the vacant, unappropriated, and unreserved public domain in the United States.

Meanwhile, another type of use of the public lands which does not require the making of a living by agriculture, has grown during 1945 to become one of the major operational problems confronting the Office. This opportunity for land settlement by World War veterans as well as civilians is afforded under the terms of a law which authorizes the lease or sale of not to exceed 5 acres of public land for home, camp, cabin, health, convalescent, recreational, or business purposes.

Popularity of the plan is indicated by the fact that applications for leases under the law totaled more than 3,200 in 1945, as compared with only 1,600 during the preceding 6-year period. To help meet this increased demand, special land examinations had to be made, with the result that more than 30,000 acres of land, the major portion of which is located in Southern California, were recommended for classification as suitable for use under the Small Tract Act.

As the fiscal year drew to a close with prospects for a rapid return of service personnel to a civilian status, interest in the small tract land settlement program increased, areas in the vicinity of Tucson and Phoenix, Ariz., Sacramento, Calif., and Denver, Colo., being applied for, as well as tracts in Idaho, Nevada, New Mexico, and Oregon. Further expansion of the program to provide still more areas for lease and a streamlining of administrative processes to facilitate the work is an essential task confronting the General Land Office in the postwar period.

ALASKAN DEVELOPMENT

The fact that more than nine-tenths of the 375 million acres of land and water in Alaska consist of public domain remaining in Federal ownership places upon the General Land Office a large share of direct responsibility for the proper administration and development of the natural resources of the Territory. Foremost among these is the obligation to furnish authentic information concerning the various types of land-use opportunities within its borders. During 1945, this requirement was met in part by the distribution of an information bulletin on Alaska which not only has served as a standard reference publication for other Federal agencies and members of Congress, but also has provided thousands of servicemen and women with data relating to the privileges and obligations inherent in the administration of the public land laws in Alaska.

Shortly after the close of the fiscal year, Congress enacted a law making the provisions of the Small Tract Act which hitherto had been confined to continental United States, equally applicable to the public lands in Alaska. As a result, plans were immediately set

under way to gear General Land Office operations in the Territory to the requirements of the new law.

At the same time, definite steps were taken for strengthening the organization in Alaska to render effective service in meeting land settlement and other problems of resource development during the postwar period. Specifically, a new regional field office of the Branch of Field Examination was established at Anchorage to handle matters formerly routed through San Francisco, while the Alaskan Fire Control Service was vested with broader authority in the protection of public land areas from fire and in the use of timber from the public domain. In addition, special examination of some of the public lands in the Territory was made during the summer of 1945 to insure up-to-date evaluation of the areas from the standpoint of suitability for agriculture or other use in the economic development of Alaska.

Sustained Yield Conservation

Maximum benefits from the natural resources of the United States in the postwar period will require a complete cessation of the haphazard use which in former years led to denuded timbered areas, abandoned "ghost towns," and the depletion through overgrazing of the rangelands of the West and Southwest. Responsibility for the attainment of this goal on the public lands under national conservation policies rests in large measure upon the operational activities of the General Land Office.

Foremost among its obligations in this field is the establishment of sustained-yield forest-management practices on all the Federal lands under its jurisdiction, as required by Congressional mandate enacted during the 1945 fiscal year. Under this program, forestry operations on the timbered public domain eventually will be brought into a balanced ratio in which the volume of tree-cutting and of tree-growing will be regulated so as to provide a continuing supply of those natural resources on the land.

Adequate protection from fire of the 262,500,000 acres of timber, grass and brush land areas of the public domain in the United States and Alaska also is an additional administrative task assumed by the General Land Office during 1945, and plans were completed at the close of the fiscal year to preserve these resources for postwar use.

REVIEW OF THE YEAR'S WORK

The dual task of meeting the public land requirements in the Nation's war program while orienting its operations to respond to the demands for public service in the postwar period, highlighted the record of accomplishment of the General Land Office during the 1945 fiscal year. Operating through 4 branches with 12 divisions in Washington, 5 agencies in the field with 25 offices scattered throughout the

West and in Alaska, and 25 district land offices also strategically located for service in the West and in the Territory, this official real estate agent of the Federal Government closed its books for the period with a net profit both in conservation advancement and in financial gains resulting from its year's work.

RECEIPTS AND EXPENDITURES

In the aggregate, the activities of the General Land Office produce cash returns several times greater than the expenditures incident to its operations. In 1945, these cash receipts totaled \$13,381,654 and represented a ratio of \$5.66 for every \$1 of the expenditures which aggregated \$2,365,005. This was the second consecutive year in which the receipts exceeded \$13,000,000, and the fourth time that receipts of the General Land Office have exceeded \$10,000,000 since 1880.

Last year's receipts totaled \$14,355,342, and expenditures \$2,321,664.

Oregon and California Revested Lands Administration

World demands for lumber and other forest products in the post-war period were reflected in operations and plans of the Oregon and California Revested Lands Administration during the 1945 fiscal year. Established in 1938 to carry out a broad program of sustained yield forestry management on 2½ million acres of land in western Oregon, which once was encompassed in a Federal railroad grant but later revested in Government ownership, this branch of the General Land Office maintains its headquarters at Portland, Oreg.

Rated as the world's largest experimental laboratory in practical cooperative sustained yield forest management, the "O. and C." lands provide the testing ground for a world pattern of forestry economy. Under this program all elements would join in operations under which tree growing would reasonably balance tree cutting to the end that a continuing supply of raw materials will be available for the existence of industry and dependent communities. Definite plans for the further advancement of the sustained-yield program in the Pacific Northwest were made by the "O. and C." Administration during the last fiscal year.

Meantime, definite contributions to the Nation's lumber needs were made during the year from the "O. and C." lands which contain one of the finest stands of Douglas fir trees in the United States. In 1945, sales of timber from these lands exceeded 426,000,000 board feet valued at approximately \$1,518,000.

The use of aerial mapping as a means of more speedily completing an inventory of timber resources in the "O. and C." lands is expected to form a part of the work program for 1946.

Further augmenting the post-war program for betterments in the industry on the Pacific coast is the planting of seedlings on the de

cluded lands by the "O. and C." organization. Utilizing Civilian Public Service enrollees, more than 1,550,000 seedlings were planted and 350,000 trees prepared for transplanting in the field during the year.

With the end of the war, studies for broader use of the "O. and C." lands for recreational, grazing and other uses which were laid aside during the emergency, were ready to be resumed at the close of the 1945 fiscal year.

Cadastral Engineering Service

Plans for reorganization of this scientific branch of the General Land Office so as to meet the demands for accurate surveys in connection with land administration during the postwar period were brought to a completion near the close of the 1945 fiscal year. Involving the transfer of headquarters for this work from Denver to Washington, D. C., the reconversion program of the Cadastral Engineering Service contemplates the execution of a greater amount of actual survey work in the field than in previous years.

One of the major requirements in the first transfer of land from Government to private ownership, cadastral surveying consists of careful measurement of areas on the ground, the recording of such measurements by the placing of monuments or other markers, and the preparation of maps scientifically compiled from field notes made by trained engineers at the time of the on-the-ground measurements.

First undertaken 150 years ago in accordance with the ordinance of 1795, these surveys were carried on in 23 States and the Territory of Alaska in order that the identification of the assets in the people's quarter-billion-dollar real estate might be adequately protected in 1945.

Altogether a total of 9,231 miles was surveyed or resurveyed in 1945, some of the 1,287,490 acres being encompassed in areas acquired for military purposes.

With an increase in land settlement in Alaska looming large as a potential postwar development, the plans of the Cadastral Engineering Service include an expansion of survey work in that Territory.

Branch of Field Examination

The examination of land upon which is based the rejection or approval of plans for its use under the public land laws, is the major responsibility of this branch of the General Land Office. By maintaining a staff of trained technicians including mining and civil engineers, geologists, lawyers, auditors, timber cruisers, range specialists, and others experienced in land investigations, the branch handled many difficult and unusual types of cases during 1945.

For example, the reappraisal of unsold lots in a townsite in upper Miami Beach, Fla., was made by field examiners from this agency

and the subsequent auction sale brought out bidders who ran prices up to a new high in Florida beach property.

At another period of the year agents of the branch were assigned to investigate mining claims on areas set aside as military bombing ranges, while a third group made extensive investigations in the now famous Alamogordo area where the atomic bomb experimentation was carried on.

Paving the way for more efficient service to the public in the development of Alaska, a new regional office was established at Anchorage. Other regional offices maintained by the Branch of Field Examination are located in San Francisco, Calif.; Billings, Mont.; Salt Lake City, Utah; and Albuquerque, N. Mex.

Responsibilities placed upon the General Land Office by Congress in the enactment of the sustained yield forestry management act greatly increased the task of the Branch of Field Examination during the 1945 fiscal year in preventing trespass upon the public domain. Altogether, over \$70,000 was collected in payment of trespass violations of the public land laws.

Alaskan Fire Control Service

Prospects of post-war development of Alaska which will increase its burdens in the prevention and suppression of fires on more than 250,000,000 acres of public domain in the Territory, confronted the Alaskan Fire Control Service at the end of the 1945 fiscal year. The end of the war is expected to bring about an unprecedented number of tourists and settlers, the reopening of mining operations, and the construction of new airfields and roads, all of which will present new and greater fire hazards.

At the same time, increased popular interest in the Territory will bring about greater demands for the use of the timber and other natural resources of Alaska. In order that full coordination may be attained in both the protection and utilization of the timber resources, expansion of the operations of the Alaskan Fire Control Service to include management and disposal of the timber on the public lands in the Territory, was begun during the year.

Meanwhile, favorable weather conditions in 1945 resulted in the new smallest fire loss in the 6-year history of the organization. During the year, the Service took action on 57 fires with a total burned area of 2,535 acres, of which 624 acres were on private land. There were 13 fires inaccessible to the Service which burned over an estimated 110,200 acres. The number of fires for the year, therefore, totaled 70, with an aggregate loss of 112,735 acres.

Service records show that there were a larger number of fires caused by lightning in 1945 than in former years, about 37 percent of the total number of fires being started by lightning, and approximately 98 percent of the total acreage consumed being due to lightning fires.

A more extensive use of airplanes for the detection of fires and the transportation of service crews to the conflagrations is contemplated under programs formulated in the 1945 fiscal year.

PUBLIC LANDS FOR PASTURES

In the 1945 fiscal year the use of more than 12,400,000 acres of public land in the United States and Alaska for the grazing of livestock was supervised by the General Land Office as another element in its administration of the people's real estate assets. Consisting of tracts in Alaska suitable for grazing purposes and similar areas in the United States not included in established Federal grazing districts, a total of 12,479,270 acres were made subject to use under 10,593 leases involving annual rental of \$229,523.

In order that maximum production of meat and other livestock products might be provided from the public lands during the reconversion period, plans were being formulated at the close of the 1945 fiscal year to increase the stocking capacity of the range lands. It is estimated that with proper range facilities and improved range practices the capacity of the leased area could be increased 50 percent and an additional 10,000,000 acres leased if the improvement and rehabilitation program is carried forward to completion. Meanwhile, operations of the Range Development Service of the General Land Office, previously halted by war conditions, were scheduled for resumption as the close of the fiscal year brought an approaching end to the war.

Under the supervision of this Service improvements on the range such as the development of springs and wells, the construction of fences, the reseeding of areas denuded of vegetation, and the control of rodents and other predatory animals is undertaken in cooperation with the stockmen.

THE PUBLIC LANDS

AREA OF THE PUBLIC LANDS

The area of public lands remaining in Federal ownership, including Indian trust and tribal lands, as of June 30, 1945, amounted to about 413 million acres in the public land States and about 365 million acres in Alaska. Approximately 400 million acres of these public lands were vacant, unappropriated, and unreserved as follows: 37 million acres in the States outside of Federal grazing districts; 133 million acres within such districts; and 230 million acres in Alaska. During the year 692,000 acres were withdrawn for various public purposes while withdrawals reserving 9,497,000 acres were revoked.

Of the approximately 778 million acres remaining in Federal ownership in the States and Alaska, 118 million acres in the States and 363 million acres in Alaska were still unsurveyed as of June 30, 1945.

The total acreage patented with minerals reserved to the United States was increased during the year to 48,766,625 acres as shown on the following table:

Acreage of lands patented with minerals reserved to the United States, as of June 30, 1945

Type of mineral reservation	Patented during fiscal year 1945	Total patented through June 1945
Reservation of all minerals:		
Under Stock Raising Act.....	15, 094	33, 556, 052
Under other acts.....	50, 684	2, 376, 256
Total.....	65, 778	35, 962, 308
Reservation of specific minerals:		
Coal.....	5, 084	10, 875, 615
Others ¹	7, 342	1, 928, 702
Total.....	12, 426	12, 804, 317
Grand total.....	78, 204	48, 766, 625

¹ Includes coal reserved in combination with other minerals.

Leases and Permits

During the year an additional area of 1,793,513 acres was brought under lease, including mineral permits and licenses, making a total of 17,707,440 acres under lease at the end of the year. The types of leases in force June 30, 1945, are shown by the following tables.

Mineral leases, permits, and licenses outstanding,¹ as of June 30, 1945

Mineral	Leases		Permits		Licenses		Total	
	Number	Acres	Number	Acres	Number	Acres	Number	Acres
Oil and gas.....	² 6, 969	4, 521, 486	-----	-----	-----	-----	6, 969	4, 521, 486
Coal.....	331	76, 190	79	66, 635	88	3, 385	498	146, 210
Phosphate.....	9	5, 911	-----	-----	-----	-----	9	5, 911
Potash.....	20	47, 292	1	2, 539	-----	-----	21	49, 831
Silicon sands.....	2	400	-----	-----	-----	-----	2	400
Sodium.....	4	1, 629	34	53, 224	-----	-----	38	54, 853
Total.....	7, 335	4, 652, 908	114	122, 398	88	3, 385	7, 537	4, 778, 691

¹ Does not include permits granted to Federal war agencies.

² Does not include 25 leases within naval reserves (10,162 acres).

Leases other than mineral leases outstanding, as of June 30, 1945

Type of lease	Number	Acres	Annual rental
Aviation.....	43	28, 776. 27	\$525. 00
Fur farm (Alaska).....	19	133, 810. 00	775. 00
Grazing (Alaska).....	9	1, 168, 953. 93	1, 269. 35
Grazing (Oregon and California).....	212	263, 044. 01	8, 368. 08
Grazing (Taylor Act, sec. 15).....	10, 584	11, 310, 316. 49	228, 254. 44
Recreational.....	17	20, 003. 78	1 610. 70
Small sites (5-acre tracts).....	626	3, 091. 32	¹ 3, 080. 00
Water well.....	15	600. 00	585. 50
Others.....	3	153. 01	10. 00
Total.....	11, 528	12, 928, 748. 81	243, 478. 07

¹ Does not include rental of 1 lease, the rental of which is based on receipts.

² Does not include rental of 10 business site leases, the rentals of which are based on receipts.

In addition, 393,000 acres were being used at the end of the year by Federal and local agencies, private individuals, and corporations under permit from the Commissioner of the General Land Office. War agencies held Departmental permits for the use of almost 24,000,000 acres of public lands.

Homesteads, Sales, and Other Entries

Although the total number of entries on the public lands declined again during the year, the number of new homesteads and public auction sales increased over last year. The number of new homesteads in Alaska totaled 117, compared to 94 in the fiscal year of 1944 and 79 during 1943.

The following table shows the new entries and selections allowed, the entries finally approved and the patents and certifications issued during the year. At the end of the year, 4,156 entries embracing 626,000 acres were pending awaiting further compliance with the public land laws by entrymen or final action by the General Land Office.

Entries and selections, fiscal year 1945

Type of entry or selection	Original entries and selections ¹		Final entries ¹		Patents and certifications ¹	
	Number	Acres	Number	Acres	Number	Acres
Homestead entries:						
Stock raising.....			26	12,711.18	32	15,094.37
Enlarged.....	8	2,162.83	11	2,622.27	11	2,799.81
Reclamation.....	17	2,133.50	118	12,715.49	158	16,458.66
Forest.....	3	178.73	3	197.67	7	530.98
Commuted.....			11	1,064.95	3	366.59
Sec. 2289 R. S., et al.....	157	18,218.69	780	8,086.58	68	6,872.43
Total homestead entries.....	185	22,693.75	249	37,398.14	279	42,122.84
Other entries and selections:						
Desert land entries.....	13	1,280.82	22	2,333.58	30	3,961.50
Public auction sales.....			149	13,058.34	110	9,454.01
Timber and stone entries.....			1	40.00	3	98.60
Mineral entries.....	49	6,487.87	87	6,095.33	58	5,814.49
Indian selections.....					103	551.04
Miscellaneous cash sale entries.....	2	(⁴)	230	2,126.04	139	8,571.27
Exchanges.....					160	72,389.57
State selections.....	25	9,802.18			24	72,226.59
Curative and supplemental patents.....					174	(¹¹)
Others.....	(⁵)	0.73	8	306.27	80	1,773.19
Total other entries and selections.....	89	17,571.60	497	23,959.56	881	174,840.26
Grand total.....	274	40,265.35	746	61,357.70	1,160	216,963.10

¹ An original entry or selection is one made in pursuance of an act of the Congress which prescribes the terms and conditions under which patent may be issued or other evidence of title granted. An original entry becomes a final entry upon compliance by the entryman with further requirements of the law, such as residence or additional payment, and upon the issuance of a final certificate. A final certificate shows that, in the absence of irregularity, the entryman is entitled to a patent and passes equitable title to the land to the entryman. Where upon final examination it is found that an entry or selection is in proper form and that the law has been complied with, a patent conveying legal title to the claimant is issued. In the case of certain State selections, the legal title is conveyed upon approval thereof by the Secretary of the Interior and upon certification by the Commissioner of the General Land Office.

² Includes 3 homesteads on ceded Indian lands (433.60 acres).

³ One selection was amended.

⁴ Town lots upon which only part payment was made; area not tabulated.

⁵ Includes 4 homesteads on ceded Indian lands (400.00 acres).

⁶ Includes 9 homesteads on ceded Indian lands (759.94 acres).

⁷ Includes 14 homesteads on ceded Indian lands (1,240.90 acres).

⁸ Includes 1 homestead on ceded Indian lands (80.00 acres).

⁹ Includes 3 homesteads on ceded Indian lands (280.75 acres).

¹⁰ Includes certifications, 47,963.15 acres.

¹¹ Acreage previously reported.

Land Grants

Title to 73,765 acres was conveyed during the year in satisfaction of grants of public lands made by the Congress to States and railroads for public purposes. Grants to States included 43,237 acres of indemnity school land selections, 14,983 acres of park selections, 9,280 acres of swamp land, and 4,726 acres selected for miners' hospitals. A total of 1,539 acres was patented to railroad companies pursuant to the Transportation Act of 1940. In addition, 16 patents were issued to States to give them additional evidence of title to 407,833 acres of previously granted school lands.

A total of 218 applications for rights-of-way were approved during the year under laws which provide for the granting of rights-of-way over the public lands for telephone and telegraph lines, public roads, pipelines, and other purposes. Of the applications approved, 104 were permits or easements with an annual rental of \$1,730 and 32 were temporary rights-of-way over "O. and C." lands with an annual rental of \$160.

Land Exchanges

Exchanges of land with private owners and local governments resulted in the addition of 56,087 acres to grazing districts in exchange for 51,954 acres of Federal land; 9,037 acres to Indian reservations in exchange for 9,079 acres; 480 acres to the "O. and C." lands in exchange for an equal acreage; and 197,395 acres to national forests in exchange for 10,877 acres of land and sufficient timber to equalize the values involved.

RECEIPTS AND EXPENDITURES

Receipts from all sources during the year totaled \$13,381,653. Mineral rentals, royalties, and bonuses accounted for 82 percent of the total receipts and sales of timber from the Oregon and California and Coos Bay lands for an additional 13 percent. The remaining 5 percent were realized from sales of public and ceded Indian lands, rentals, fines and penalties, copying fees, and from miscellaneous sources.

Of the total receipts, 38 percent will be distributed among various State and county governments and 44 percent will be covered into the reclamation fund. The remainder, except for \$10,384.58 which will be credited to Indian trust funds and \$57,734.66 which will be credited to the range improvement fund, will be covered into the general fund of the Treasury.

Expenditures from appropriations amounted to \$2,365,005 distributed as follows: general administration, \$867,783; surveys, \$517,297; field examination, \$343,482; administration of the revested and reconveyed grant lands, \$290,956; district land offices, \$267,925; range improvements, \$44,275; and fire control in Alaska, \$33,287. Ex-

penditures, aggregating \$319,191, were made from funds transferred to the General Land Office for the emergency protection of public lands and for soil and moisture conservation operations.

The following table shows the receipts earned during the year, by sources and Treasury accounts.

Disposition of receipts of the General Land Office:¹ fiscal year 1945

Source of receipts	Covered in the Treasury earmarked for—				
	General fund	Reclamation fund	States and counties	Indian trust funds	Total
Sales of public lands.....	\$79,582.17	\$100,000.00	\$3,800.00		\$183,382.17
Fees and commissions.....	17,359.71	\$61,000.00			78,359.71
Mineral leases and permits:					
Mineral Leasing Act.....	1,005,976.36	5,281,375.89	3,772,411.35		10,059,763.60
Red River oil and gas lands.....			3,399.75	\$5,666.24	9,065.99
Potash.....	68,098.61	\$410,095.34	255,369.79		733,563.74
Other.....	\$216,604.10				216,604.10
Total mineral.....	1,290,697.07	5,691,471.23	\$4,031,180.89	5,666.24	11,018,997.43
Oregon and California grant lands.....	867,094.56		867,094.57		1,734,189.13
Coos Bay grant lands.....	15,433.74		\$15,000.00		30,433.74
Taylor Act grazing leases.....	57,734.66	\$57,734.66	115,469.32		230,938.64
Rights-of-way leases.....	31,977.49	444.51			32,422.00
Sales of reclamation town lots.....		\$7,498.64			7,498.64
Sales of Indian lands.....				4,718.34	4,718.34
Copying fees.....	21,103.63				21,103.63
Miscellaneous.....	39,609.46				39,609.46
Grand total.....	2,420,574.49	5,918,149.04	5,032,544.78	10,384.58	13,381,652.89

¹ Before final settlement of all accounts by the General Accounting Office.

² Estimated.

³ Includes \$52,577.64 collected in California under act of Oct. 2, 1917 (40 Stat. 297).

⁴ Includes \$23,767.94 collected in Wyoming under act of June 26, 1926 (44 Stat. 1621), \$176,868.94 collected in California under Executive Order 9087 dated Mar. 5, 1942, and \$15,967.22 collected in Alaska.

⁵ Range improvement fund.

⁶ Includes \$112.50 from sale of reserved reclamation lands.

Office of Land Utilization

LEE MUCK, *Assistant to the Secretary*



RECONVERSION in a broad sense means the return of the Nation as expeditiously as possible to the pursuits of peace. For the Department of the Interior it points to the need of an inventory of those national assets for the management of which we are directly responsible; a determination as to the extent of the depletion of these assets which may have occurred as a result of the war; and the preparation of plans which will insure a maximum restoration of the impaired values and the development of a sustained national economy. The basic wealth of the Nation, represented in large measure by its soils and waters, forests, and pasture lands, has been drawn upon as never before to provide the essentials of war that brought victory to the United States and its allies after five destructive years. Reconversion to a sound peacetime economy following the war and its attendant heavy drain upon the natural resources of the Nation therefore presents a problem and a challenge to the Department in the field of land and resource management.

The problem and the challenge involved in reconversion place a responsibility upon the land and resource management agencies of the Department to provide a more fully coordinated and integrated management program by virtue of which the lands and resources under their respective jurisdictions will be so administered as to insure the greatest possible returns to society in the years ahead.

The value of cooperation and of coordinated and integrated action to secure desired results was most clearly demonstrated during the war. The principles involved were not new but the successful application thereof under so many and such varied conditions constituted a complete demonstration of the importance of unified action in the conducting of operations. If the same cooperative approach is applied to the solution of the problems of peace, the future of the Nation is assured, regardless of the serious drain on its natural resources.

The land and resource management problem facing the bureaus and agencies of the Department of the Interior in reality is not one problem but many problems, all closely related and having a distinct

bearing on the successful establishment of peacetime economy. The complexity and interrelation of land and resource management problems which exists has been recognized in the Department for many years and finally brought about the establishment of the Office of Land Utilization in the year 1941 with a view to evolving a unified conservation program. In the interim much has been accomplished, but much more remains to be done to coordinate and integrate fully and effectively the operations of the respective bureaus and agencies of the Department and to secure effective cooperation with other governmental agencies operating in similar land-use fields.

While major attention during the past 4 years has been directed to winning the war, nevertheless the long-time problems of peace have not been neglected, and marked accomplishments have been made in several important lines of cooperative endeavor, namely:

1. The development of a Nation-wide soil and moisture conservation program on lands under the jurisdiction of the Department of the Interior.
2. The coordination of the forestry activities and the development of a more effective forest and range protection program.
3. The clarification and reorientation of the land-use policies of the Department and the establishment of sound land-classification procedures.
4. The organization of the Water Resources Committee which is charged with the responsibility of acting for the Department and its agencies on problems affecting the water resources of the Nation.
5. The rendering of advisory service looking to the solution of numerous day-to-day management problems that constantly arise in a Department with highly diversified activities.

The encouraging results accomplished were made possible through the application of a high level of functional coordination and the integrating and reconciling of divergent views, experiences, and judgments in the field of land administration. The objectives sought were attained through cooperative efforts and the dissemination of information with respect to operating programs and practices and through the rendering of technical service on management problems. The practical application of these administrative principles and the degree of success achieved in the several fields in which they were applied are hereafter set forth.

SOIL AND MOISTURE CONSERVATION OPERATIONS

The Soil and Moisture Conservation program of the Department of the Interior is an integrated and coordinated program conducted through the land-management agencies of the Department on the Federal lands under their respective jurisdictions. It is a segment of

the national soil conservation program, the other parts of which are conducted by agencies in the Department of Agriculture. It has for its purpose the correction of soil erosion and water losses occurring on approximately 60 million acres of land widely distributed through the various States in which there are public lands. The principal areas on which soil and moisture conservation operations are being performed comprise portions of the various river basins lying west of the Mississippi River and largely west of the Rocky Mountains.

Within each of these river basins there are land areas administered by some one or more of the land-management bureaus of the Department. For example, in the Snake River Basin—a tributary of the Columbia—there are national parks and monuments, fish and wildlife refuges, Indian lands, reclamation projects, grazing districts, and unappropriated and unreserved public domain areas. An orderly, integrated plan of soil and moisture conservation on Federal lands under the jurisdiction of the Department of the Interior in the Snake River drainage basin requires that the Department exercise supervisory authority over conservation operations in the whole area in order to insure that the various land-management agencies perform soil and moisture conservation operations within the basin that are essential to the correction of the situation as a whole. These operations are further coordinated with the management responsibilities of the agencies concerned in order that full value may be obtained from the restoration and management work performed. Furthermore, since there are intermingled lands in private ownership within the basin, and also lands under the administration of other Federal and State agencies, it is necessary that the Department of the Interior conservation program be coordinated with the programs of these other agencies. Specific reference in this connection is made to the State soil conservation districts operating under State law with the advice and aid of the Soil Conservation Service, Department of Agriculture, and the general program of the Forest Service, also in the Department of Agriculture.

The problem is a complex one from any angle. The task of restoration under the best of circumstances is difficult. The complex land ownership pattern and the conflict of interests and uses tends further to complicate the situation.

The Office of Land Utilization determines the over-all program in the areas where operations are to be conducted, harmonizes and compromises any differences that may develop, and provides for a maximum amount of assistance necessary to secure correction of erosion and water losses. To this end, advice and assistance are given to the agencies concerned regarding the conditions and circumstances under which projects may be established, the type and character of work to be performed, and approval of the expenditures to be incurred. Under this program attention can be, and is, directed to-

ward the correction of conditions on the more critically eroded areas of Federal lands and the operations performed are those of proved value as demonstrated heretofore under like soil and other conditions.

Wherever possible the securing of a maximum amount of cooperation from the users of the lands is urged, for, while the lands are exclusively or primarily in Federal ownership, the users who are dependent thereon for a livelihood have a definite interest in their reconstruction and improvement. This cooperative feature constitutes a further coordination of the soil and moisture conservation program which facilitates and hastens the corrective procedures while providing more definite assurance against recurrence of the destructive processes that have heretofore occurred. The constant pressure by the Department in this matter of cooperation has resulted in a year-to-year increase in the amount of such cooperation, until at the present time the amount contributed is almost equal in value to the appropriations authorized by Congress for soil and moisture conservation operations on the Federal lands.

The soil and moisture conservation program of the Department comprises operations on 500 project areas scattered through 30 States, embracing a total area of approximately 60 million acres. It has been determined that of this total between 10 and 12 million acres can be classed as being in a serious or critically eroded condition. Approximately 20 million acres in addition should receive some attention from a soil and moisture conservation standpoint, with the remaining 30 million acres largely in the twilight zone where material benefits from a conservation standpoint can be obtained without too large expenditures, provided the lands and resources are properly managed.

FOREST CONSERVATION

In the field of forest conservation the program of the Office of Land Utilization has been mainly directed toward the accomplishment of three specific objectives:

1. The securing of adequate protection for the forest and range resources administered by the Department.
2. The development of the sustained-yield principle in the management of the forest resources under the jurisdiction of the Department.
3. The formulation of a sound plan of management for the forests of the interior of Alaska.

In the field of protection the Office of Land Utilization rendered advisory service to the agencies concerned in more fully and adequately presenting to the Congress the whole forest protection problem on the 400 million acres of forest, brush, and grass lands under management in the continental United States and Alaska. Appropriations made available during the past 4 years have more than doubled and, while not yet sufficient to provide adequate protection

for all of the lands in need thereof, the several agencies concerned are better organized and better prepared than ever before to protect the public lands from the ravages of fire, insects, and disease. As concrete evidence of progress in this direction, it should be noted that the area burned over in the continental United States has been reduced from 1,879,613 acres in the calendar year 1942 to 552,235 acres in the calendar year 1944; and in Alaska, from 4,500,000 acres in 1940 to 110,603 acres in 1944.

Cooperative work carried on with the Bureau of Entomology and Plant Quarantine, Department of Agriculture, in which the Office of Land Utilization acts in a supervisory capacity, has brought about the coordination of white pine blister rust control operations designed to protect the valuable five-needle pines from the white-pine blister rust. Control work has been definitely advanced on the national parks, Indian reservations, and the Oregon and California revested grant lands. At the close of operations last December, a total of 163,000 acres out of the 728,000 acres of white pine lands under the jurisdiction of the Department had been covered by the preliminary eradication of the species of brush responsible for the spread of the disease. Plans are in preparation involving expanded and more intensive operations looking to the control of infections that are a constant menace over large areas of land, portions of which are under the jurisdiction of the Department.

Sustained yield of forest resources contemplates improvement in conditions of growth, management of the timber stand, and utilization of the timber crop in ways that will permit and sustain the entire economy built around the lumber industry. The Office of Land Utilization participated during the preceding year in the preparation and presentation to the Congress of information relating to the values inherent in the sustained-yield principle. The representations made in this connection by Federal, State, and private agencies resulted in the enactment of the cooperative sustained-yield forest management act of 1944, authorizing the Secretary of the Interior and the Secretary of Agriculture to establish sustained-yield units either directly or in cooperation with other forest land owners. A general statement of policy with respect to the administration of this law was formulated by the Department for the guidance of the agencies concerned. Marked progress was also made in the application of the sustained-yield principle under the O. & C. Act of 1937, and a form of cooperative agreement was worked out by the General Land Office and the Office of Land Utilization.

The major forward step taken by the Department in the field of forest conservation during the year 1944 was the securing of a regular appropriation of \$147,460 "For the administration and management of forest resources, including the prevention and suppression of fires

on the public domain in Alaska, * * *." This appropriation will make possible the setting up of administrative machinery, under the direction of the General Land Office, which will insure the protection and management of these vast resources of the interior of Alaska for the first time since the Territory was acquired from Russia. It means for Alaska, and for the Nation, the protection of these forests from fire and the establishment of sound forestry practices in connection with the development thereof.

The timber sale operations conducted on the lands under the jurisdiction of the Department normally constitute a business amounting to more than 3 million dollars in value and reflect a timber cut of over a billion feet a year. War demands continued at a high level during 1944 and, as a result, a large number of timber contracts were considered and approved by the Department.

LAND CLASSIFICATION AND LAND POLICY

During the year 1944 a study was conducted of the land-classification activities of the General Land Office and the Grazing Service, and recommendations were made for coordination and expedition with respect to these activities. A draft statement for the Departmental Land Policy Committee on the land-management policies of the Department was completed and submitted to the Department for final consideration. Land-administering agencies of the Department were kept informed concerning surplus real property in which such agencies might have an interest, and a survey was initiated looking to the compilation of a list of surplus areas suited for addition to existing administrative units. About 1,500 applications involving the disposal, lease, or permitted use of public lands were reviewed. Many of these cases were on appeal or otherwise involved controversial issues and required most careful consideration before recommending action. The General Land Office was assisted in preparing a statement of conservation policy with respect to the sale of isolated tracts of the public domain, and the statement was issued as Departmental Order No. 1973, under date of August 4, 1944.

CIVILIAN PUBLIC SERVICE CAMPS

The Office of Land Utilization continued to act in a liaison capacity between the Selective Service System and the bureaus of the Department of the Interior in the operation of the civilian public service camps during the year 1944. These camps, which provided work of national importance in the protection and conservation of natural resources—including fire, insect, and disease control and water conservation projects—were under civilian direction and were manned by persons who, by reason of religious training or belief, conscientiously opposed participation in the war.

At the close of the year, 10 civilian public service camps were operating on Department of the Interior lands: 5 on the national parks, 3 on reclamation projects, 1 on the O. & C. lands of the General Land Office, and 1 on a national wildlife refuge. The Seney National Wildlife Refuge camp, located in the State of Michigan, was abandoned on June 1, 1945.

WATER RESOURCES COMMITTEE

The staff work of the Water Resources Committee, established by departmental order dated May 2, 1944, was conducted by the chairman and the executive officer during the fiscal year just passed. The objective sought by the Committee is to insure the coordination of water-development programs within the Department in order that full recognition may be given to the over-all benefits to the Nation.

In carrying out its stated functions, namely, the assembly and dissemination of essential information concerning water-development programs, the following work was accomplished by the Committee:

1. Sixteen formal meetings were held; and the executive officer represented the Committee at 12 meetings of the Federal Interagency River Basin Committee.

2. Recommendations designed to promote cooperation and coordination at the field level were submitted to, and received the approval of, the Secretary.

3. Consideration was given to a number of project and basin reports of agencies within the Department and the War Department, and definite recommendations were made thereon.

4. Detailed information concerning water projects, laws, policies, and related features was assembled and made available to the interested agencies of the Department.

5. Operating procedures looking to the coordination of the water-development and water-conservation programs of the Department were established.

The progress made in the coordination of the water-development programs of the Department of the Interior has been encouraging, and the procedures laid down by the Congress in the Flood Control Act of 1944 and the Rivers and Harbors Act of 1945 have greatly strengthened the cooperation between the Federal agencies and the States. However, much remains to be accomplished before the degree of coordination essential to sound management in this complicated field can be fully attained.

PRINCIPLES OF COORDINATION

Experience in the Department of the Interior during the past several years has clearly demonstrated the value of effective coordination and close cooperation in the field of land and resource management. It

seems obvious also that the coordination of conservation activities of a Department organized on a bureau basis can be secured by devices less drastic than complete centralization and that a common plan of action which cuts across structural lines in the pursuit of an over-all interest is possible of attainment without seriously disrupting well-established bureau organizations.

The Office of Land Utilization, since its creation in 1941, has proceeded on the theory that the application of the fundamental principles of coordination and cooperation can be effected without overlapping or duplication and without interfering with the administrative authorities of the bureaus operating in the various functional fields. It has earnestly sought to promote a unification of action directed towards a common goal through cooperative efforts, the dissemination of information, and the rendering of efficient advisory service. The methods pursued have proved to be reasonably successful and have operated definitely in the public interest. It seems clear that the time has arrived when these principles of administrative management should be extended to all agencies operating in the conservation field, for the effective use and development of the basic wealth of the Nation—its soils and waters, its forests and pasture lands—will not be at its best until all interests involved have fully coordinated their responsibilities and activities.

Grazing Service

C. L. FORSLING, *Director*



UNDER the administration of the Federal range, as provided by the Taylor Grazing Act, the surface resources of the grazing districts on most of these public lands were in as good condition at the close of the fiscal year as they were at the beginning of the war, or better. At the same time they made their contribution in meeting the Nation's needs for war. This is in sharp contrast to the First World War when increased numbers of livestock, on the then unregulated, open public range, which, under the circumstances, did not contribute materially to food supplies during the war, resulted in overstocking that added to the already serious degree of depletion of the forage and soil resources.

The aim of the administration of the grazing districts is twofold; namely, the protection, improvement, and proper utilization of the natural resources on these lands and the stabilization of the livestock industry dependent upon them. These public lands, together with the non-Federal lands associated with them, continued during the past year to contribute to the Nation's needs of food and fiber, without material injury to their permanent productive capacity. While the Federal range on the whole is still far below its potential production capacity, due to past overuse and fire, extensive areas actually improved in condition as the result of weather conditions above the average, coupled with regulated use.

Nearly 40 percent of the range land in the 11 Western States is situated within grazing districts. Somewhat more than half of this is Federal land; the remainder is in private, State, and county ownership. Associated, both physically and economically, these grazing lands and the intermingled crop lands are the foundation of numerous livestock producing enterprises. Although range land makes large contributions by providing grazing for livestock and big game, its problems are closely related to those of other resources among which are water, wood, crop lands, and recreational use.

Settlement of public land under the homestead pattern of earlier years was reached and over-run during the aftermath of the First World War. New frontiers now lie chiefly in managing the remnant

of the former vast public domain so that it may be put to its highest use and fitted into the over-all land-use economy of each locality. The benefits to be derived are shared by the range users, local communities, and the public.

The war has also emphasized the importance of the Federal range in the training of air and ground troops, the testing of machines, precision instruments, and explosives, and in perfecting techniques of modern warfare. A total of approximately 14,500,000 acres was so utilized. Through cooperation with the War and Navy Departments it was possible for certain of the affected lands to be grazed at the proper time without interference with their use for military purposes. In other instances it was necessary to exclude livestock. One withdrawal in New Mexico, for example, involved the removal from grazing district land of 8,421 cattle, 618 horses, 12,432 sheep, and 10,861 goats belonging to 47 permittees. In still other instances, through special arrangement with the military services, it was possible to provide alternate grazing during the war period for nearly 500,000 sheep and 16,000 cattle on areas set aside for war purposes in several States.

First among the resources and values of the Federal range are the plant cover and the soil. Their protection and improvement are basic to all other uses and values and particularly to the sustained yield of forage for grazing animals. Of equal, if not of greater importance, is the relation of these lands to water supply for irrigation and other purposes. Numerous individual ranches and farms, as well as communities, obtain their water supplies directly from these lands. In addition the Federal range and associated lands contribute more or less run-off to streams which are the source of supply to distant towns, cities, and irrigated fields. Water is so important in the West that it is imperative that watershed lands be maintained in a condition to yield the maximum quantity and quality of water. Silt-laden reservoirs and clogged streams or irrigation canals are a direct concern to irrigation, industry, and commerce, as well as to the farmer at the far end of the ditch. Maintaining adequate plant cover conditions is the key to adequate watershed protection.

Thousands of families obtain fuel, fence posts, farm timbers, and rough lumber from the 23 million acres of woodland and forest on the Federal range. No detailed survey has ever been made of the forest and woodland growth. Assuming, however, that the areas classified as woodland and forest contain an average of 10 cords of wood to the acre, there are 230 million cords of wood in grazing districts. In addition to the foregoing there are special use values, such as rights-of-way, home and business sites, recreation, and sites for commercial photography.

No adequate survey has ever been made to determine the value in terms of dollars and cents of the surface resources of the public land in grazing districts. Any attempt to do so at this time, therefore, must be based upon many assumptions. It may be assumed, for example, that 144 million acres of grazing land have an average value of \$1.25 an acre for soil and forage. The estimated 230 million cords of wood are considered to have a value of 50 cents a cord.

Many factors enter into the problem of attaching a tangible cash value to these lands for watershed purposes. What is the value of a watershed, for example, to a community which derives its domestic water supply from it? What protection values may be assigned to a given area for the control of floods, the prevention of the deposition of silt in streams and reservoirs, or the abatement of dust storms? Certain areas rank high in these respects and at the other extreme, certain other areas have practically no watershed value. Hence, the dollar value of watersheds, ranging from \$12 or \$15 an acre or more in some localities to nothing in others, may be arbitrarily set at \$1 an acre for the 144 million acres of Federal range.

It would be difficult to estimate the value of the public lands for training and testing grounds and the parts these lands played in winning the war. Had the Federal Government been obliged to purchase the 14½ million acres of public lands used for war purposes, a considerable item would have been added to the cost of the war. The availability of these lands for war purposes and for special uses as home sites, commercial photography purposes, rights-of-way, and stock driveways, for which the Federal Government derives revenue, is arbitrarily placed at \$52,000,000.

In addition to the foregoing, range improvements placed on the Federal range at public expense during the past 10 years, consisting of 17 major types, are estimated to have a residual value of \$10,000,000.

On the basis that has been outlined, the capital value of the 144 million acres in the custody of the Grazing Service may be tabulated as follows:

Soil and forage at \$1.25 an acre.....	\$179, 000, 000
Watershed at \$1 an acre.....	144, 000, 000
Woodland and forest, chiefly woodland, at 50 cents a cord.....	115, 000, 000
Range improvements.....	10, 000, 000
Special uses.....	52, 000, 000
Total.....	500, 000, 000

In undertaking to rehabilitate the range and stabilize its use, the Grazing Service generally has had the active support and cooperation of the users themselves, including the district advisory boards. A much greater interest and concern in the condition of the range on the part of the stockmen is noticeable as compared to a decade and a

half ago. The Grazing Service is hopeful that the willing cooperation of the range users, who, after all, are most vitally concerned in maintaining and improving forage production on the range, will bring about, within practical time limits, the further adjustments that may be needed wherever necessary to stop further range deterioration and to turn the trend in favor of range rehabilitation.

In addition to rehabilitation, extensive further development of the range is needed to facilitate range administration, promote its full economic utilization, make possible better handling of livestock, and improve the quantity and quality of the resources. Needed projects include water developments, fencing, construction of roads, trails, and telephone lines, rodent control, the installation of improvements for fire control, soil and moisture conserving structures and improvements of the forage cover by both natural and artificial reseeding.

The forage cover, and hence the grazing capacity, can be improved within justifiable economic limits on literally millions of acres of the Federal range by mechanical treatment and reseeding. The presence of thrifty sagebrush, for example, which occurs on millions of acres of land, is indicative that soil and moisture conditions are ample for the production of a good forage cover. Over extensive areas the sagebrush has thickened to an extent that the better forage plants have been greatly reduced or almost entirely eliminated. By the judicious use of controlled burning or breaking down the sagebrush with heavy equipment, the land can be freed of sagebrush in a manner to permit the growth of grasses and other forage plants. Where the remaining native forage plants are insufficient to revegetate the land naturally, reseeding will be necessary. A vast opportunity lies ahead in this line of endeavor in the grazing districts. The same is true also for extensive areas of nonsagebrush land needing rehabilitation.

The Grazing Service has presented estimates for a postwar conservation program for use especially in the event that an emergency employment program should become necessary. Employment under this program, in addition to the unskilled labor, would include engineers, draftsmen, range technicians, carpenters, drillers, truck drivers, tractor operators, dragline operators, and many other types of skilled labor.

Since the areas where the work is proposed are remote from centers of population and the projects variable in size and character, it would seem feasible to operate from work camps to be distributed over the territory. This will likewise be attractive to local citizens who seek employment within reasonable proximity of their homes. The plan contemplates construction of 150 portable camps with facilities to accommodate 100 men at each camp.

The backlog of work in sight is estimated to require 67,000 man-years or full employment of 20,000 men for 3¼ years at a total cost of \$191,422,500. Of this total, the amount of \$50,714,500, about 26

percent, is estimated on the basis of actual needs of the range, to be in the interest of the livestock industry, and predicated on increased forage production values which would compensate for the carrying costs of the investment. The balance is considered to be a responsibility of the Federal Government to rehabilitate, preserve, and protect the capital values inherent in the land and its resources in the public interest.

RANGE ADMINISTRATION

Forage conditions during the year were, on the whole, better than average during the previous year but extreme drought persisted in localized areas causing some losses. The grazing load in terms of permitted animal units declined 1 percent while the numbers of permitted livestock decreased 6 percent from 10,694,305 to 10,019,178 head. There were 725,464 fewer sheep, but 86,174 more cattle during 1945 than in 1944. For the first time in grazing district history the number of permitted cattle exceeded 2,000,000 head.1

Ranch sales involving grazing preferences on the Federal range and transfers of privileges under the Federal Range Code reached a new high during the year. Livestock generally were in good condition and with the current high prices and consumer demand the users were encouraged to cut down their numbers, especially cattle, as a means of providing for the dry years which, according to experience, inevitably lie ahead. Losses of forage caused by trespassing stock and range fires are still excessive. This situation cannot be corrected fully until adequate manpower on the ground is available to patrol and supervise the area.

The grazing district advisory boards are an important part of the Grazing Service organization. Their cooperation in lending advice on range problems, improvement, wildlife protection, and economic conditions within the industry aided materially in the administration of grazing districts during the eleventh year of their participation in the program.

Recheck of grazing capacities and proper seasons of use and the reexamination of many dependent properties are recurrent jobs. The ultimate goal of properly stocked ranges subdivided into units or allotments, to be utilized under term permits by all who are entitled to share in the use of the range has not been wholly achieved.

Only two-thirds of the authorized users are operating on a term-permit basis although most of the licensees and permittees can now plan their year-to-year range operations with reasonable assurance, subject, of course, to the variable weather conditions and other unforeseen factors, including needed adjustments which will be necessary in some cases upon completion of range surveys and base property inventory.

GRAZING FEES

In regard to the fees to be charged, section 3 of the act provides: "That the Secretary of the Interior is hereby authorized to issue or cause to be issued permits to graze livestock on such grazing districts * * * upon the payment annually of reasonable fees in each case to be fixed or determined from time to time." Grazing fees of 5 cents for cattle and horses per month and 1 cent for sheep and goats were established in 1936 when the livestock industry was beginning to recover from drought and depression and when grazing districts were new. During the year consideration was given to increasing the grazing fees pending the completion of a comprehensive range appraisal. This matter was first broached to the National Advisory Board Council in November 1944. Since then and up until September 10, 1945, further study and 10 hearings on the matter have been conducted by the Senate Committee on Public Lands and Surveys, in Washington, D. C., and 8 of the Western States. Recommendations on the fees by the Director are being delayed until the facts presented at the hearings and obtained through various studies have been fully analyzed.

LICENSES AND PERMITS

Due to transfers, liquidation, and suspension of emergency licenses there was a reduction of licenses and permits issued during the year from a total of 22,562 in 1944 to 21,650 in 1945, a difference of 912. Livestock use the range under licenses and permits at various periods during the year. The statistical detail is shown by regions in table I at the end of the chapter.

Big game numbers in grazing districts represented by 11 major species totaled 583,432 head. A proper distribution of game animals over the range generally has not been achieved and, as a consequence, many "sore spots" exist where game is concentrated to the detriment of both game and forage.

Approximately 20,000 excess horses were removed from the range during the year. Action under the Secretary's orders of March 16, 1943, and January 29, 1944, resulted in the removal of about 100,000 surplus horses from grazing districts and adjacent lands during the past 3 years. Steps are needed to encourage purchase and shipment of excess horses by appropriate agencies for food and farm purposes in devastated countries.

RANGE SURVEYS

Extensive range surveys were accomplished on 2,065,964 acres in four regions. On 1,051,661 acres previously surveyed the grazing capacities were checked in preparation of range management plans. In connection with the allocation of range privileges in one district,

1,819,697 acres were surveyed on a reconnaissance basis. Approximately one-third of the above acreage is within approved soil and moisture conservation projects. Property examinations were made in 1,839 cases during the year. An estimated job load of 17,959 such cases exists in 60 grazing districts of which 13,673 have been examined to date, only one-third of which are completed to required standard. The appropriate decision as to the relative claims of about 5,000 bona fide applicants for range privileges is still tentative and unsettled. This program should be augmented in order to achieve the conservation objectives of grazing districts.

HEARINGS AND APPEALS

During the fiscal year 1945, 100 appeals from decisions of the local administrative officers were filed, 86 of all pending appeals being disposed of by cooperative actions between the appellants and district rangers or through formal hearings and decisions of examiners. Ten examiners' decisions were appealed to the Secretary.

LAND PLANNING AND UTILIZATION

Fundamental in the conservation program is a policy which will fit the complexities of land ownership within grazing districts into manageable units whereby the land can be properly administered and the greatest benefits will accrue to both public and private lands. This is accomplished mainly through exchange of lands, exchange of use, cooperative agreements with States, counties, and individuals, and by leasing lands within the boundaries of grazing districts under the Pierce Act.

Land planning in grazing districts to improve the pattern of ownership was undertaken and considerable progress has been made during recent years. Detailed plans involving a long-time program of exchange, blocking and negotiation were submitted for review. One of the most effective means of coordinated land administration in areas of mixed ownership is through cooperative agreements with the individuals, groups, or agencies affected. A number of such agreements were inaugurated during the year and many that were entered into during previous years were continued.

COOPERATION WITH MILITARY SERVICES

At the end of the fiscal year 14,403,302 acres of public land in grazing districts were involved in military withdrawals and use permits representing a reduction of 25,617 acres from the amount used for such purposes during the previous year. Major military uses of public lands include testing ranges for bombing, aerial gunnery, machine-gun practice, and areas for airfields, airports, landing fields,

tank corps maneuver grounds, proving grounds, storage dumps, and depot centers. Also lands were provided the War and Navy Departments, the Defense Plant Corporation, the Civil Aeronautics Administration, and the Federal Housing Authority for rights-of-way, telephone lines, water-pipe lines, landing strips, and airfields.

Other activities in connection with the war program included the consideration of applications for timber, involving millions of board feet, in grazing districts under the act of June 5, 1942 (Pub. Law 586, 77th Cong.). Assistance was given to military services in the appraisal of nonpublic lands listed for lease, purchase, and condemnation.

STATUS OF GRAZING DISTRICTS

Grazing districts total 60 in number, there having been no change during the year. However, modification orders, withdrawals, and revocations involving public lands mainly for reclamation and military purposes caused many internal changes in grazing districts, resulting in the addition of about 5,000,000 acres of all categories of land to the total area administered during the previous year. The statistical detail of grazing district acreage is shown on table II at the end of the chapter.

LAND CLASSIFICATION

At the beginning of fiscal year 1945, 283 individual land cases were pending within grazing districts under sections 6, 7, 8, and 14 of the Taylor Grazing Act; the 5-acre-tract law of 1938; and other public-land laws. A total of 783 new cases were received, 671 were disposed of, and 395 were pending at the close of the year.

PIERCE ACT LEASES

Favorable economic conditions of recent years have created an active demand for non-Federal grazing lands as well as for crop lands within the boundaries of grazing districts. As a result, much of the State and county-owned land formerly leased under the Pierce Act was sold or leased to individuals. The area of Pierce Act leases at the end of the year totaled 928,500 acres in 6 States.

APPROPRIATIONS AND ALLOTMENTS

Administrative funds provided by Congress for the fiscal year totaled \$1,047,740. Of this amount \$119,630 was for fire suppression and presuppression leaving \$928,110 for grazing district administration. In addition \$115,000 for construction and maintenance of range improvements, and \$8,500 for leasing of lands under the Pierce Act were available from direct appropriations. Allotments for emergency fire fighting totaled \$125,000 and for soil and moisture

conservation work \$492,500. Advisory boards contributed \$77,115.83 for range improvements. The Public Roads Administration transferred to the Grazing Service \$520,500 for construction and maintenance of access roads to mineral deposits and other war material in eight States.

FEES COLLECTED AND DISTRIBUTED

Earned grazing fees during the year totaled \$765,382.35, of which \$211.93 was deposited to the credit of Indians in Arizona and \$382,-585.24 was paid to 10 Western States for expenditure under State law. Grazing fee income for the year by States with the respective amounts paid to States shown in parentheses, are summarized as follows: Arizona \$40,059.14 (\$19,923.60); California \$19,767.67 (\$9,883.81); Colorado \$51,503.65 (\$25,751.84); Idaho \$77,851.91 (\$38,925.98); Montana \$52,961.47 (\$26,480.71); Nevada \$118,411.97 (\$59,206); New Mexico \$118,277.65 (\$59,138.80); Oregon \$52,035.92 (\$26,017.-97); Utah \$133,079.86 (\$66,539.95); Wyoming \$101,433.11 (\$50,-716.58). Earned fees in grazing districts for the 10-year period ending June 30, 1945, now total \$6,927,036.03, of which \$3,444,632.58 have been paid to the above listed States under provisions of the Taylor Grazing Act.

The Service continued to be hampered by a large personnel turnover, mainly in field and clerical positions. This affected chiefly the district and regional offices and reduced materially the output and the quality of pressing work. Excessive time of supervisory personnel was required in training new employees. Many costly delays in work programs were experienced due to lack of repair facilities and scarcity of materials and parts.

RANGE IMPROVEMENT

During the war the Grazing Service has maintained a policy of limiting its construction program to projects that were absolutely necessary to aid the production and handling of livestock on the range. Only 651 stock-water developments, 342 miles of truck trails, 125 miles of stock trails and driveways, and 390 miles of fence were built. On the other hand, strong emphasis was placed on the maintenance of range improvements previously constructed.

A summary of range improvements with accumulative totals is shown on table III at the end of the chapter.

SOIL AND MOISTURE CONSERVATION

Soil and moisture conservation activities were conducted on 55-project areas. Nine additional project areas were added during the

year resulting in a total of 114 active projects. Plans for rehabilitation were formulated on 12 areas which are pending approval. The new project areas approved entail revegetation of about 82,000 acres of depleted Federal range. Within active projects 24,000 acres of range reseeding was accomplished, and 150,000 acres were treated for rodent control.

FIRE CONTROL

Approximately 100,000,000 acres of Federal range are considered to be within the urgent fire protection zone as determined cooperatively by Federal, State, and private protection agencies. Fire records are kept by calendar years. A total of 297,481 acres of Federal land was burned over in calendar year 1944 as compared to 1,206,715 acres in 1942. In this 3-year period the average size of fires has been reduced from 1,537 to 674 acres.

ACCESS ROADS

Participation in the construction of access roads to raw materials needed for war continued throughout the year but on a reduced scale. A total of 326 miles of roads was constructed, bringing the total mileage to 1,896 in 3 years. Principal materials tapped by these roads are copper, lead, zinc, iron, coal, timber, oil, fluorspar, talc, manganese, phosphate, corundum, vanadium, tungsten, chromium, mica, gilsonite, and arsenic.

TABLE I.—Number of licensed operators and livestock in grazing districts by region, June 30, 1945

Region	Licensed operators	Cattle	Horses	Sheep	Goats	Total livestock
Arizona.....	621	109,800	2,414	105,881	12,684	230,759
Colorado.....	2,062	186,216	7,115	785,961	164	979,456
Idaho.....	3,341	230,690	16,285	1,072,161	10	1,319,146
Montana.....	3,201	264,207	26,350	1,054,055	44	1,344,656
Nevada-California.....	1,539	406,886	17,557	809,359	2,815	1,236,617
New Mexico.....	2,733	293,524	9,036	578,814	35,131	916,505
New Mexico 7.....	1,493	3,151	5,425	93,466	11,768	113,810
Oregon.....	1,459	216,800	14,716	278,166	.....	509,682
Utah.....	3,739	195,816	8,155	1,619,898	3,720	1,827,589
Wyoming.....	1,462	169,356	12,181	1,359,171	250	1,540,958
Total.....	21,650	2,076,446	119,234	7,758,912	68,586	10,019,178

TABLE II.—Status of grazing districts—approximate acreages of Federal land as of June 30, 1945

State	Number of districts	Withdrawn by establishment of grazing districts	Other land administered by Grazing Service	Total land administered by the Grazing Service	Other land	Gross area
Arizona.....	4	8,787,791	2,521,880	11,309,671	6,861,729	18,171,400
California.....	2	2,904,290	473,148	3,377,438	6,453,962	9,831,400
Colorado.....	8	7,547,765	596,161	8,143,926	7,759,774	15,903,700
Idaho.....	5	12,286,452	1,374,249	13,660,701	8,206,899	21,867,600
Montana.....	6	5,248,432	2,220,109	7,468,541	24,500,159	31,968,700
Nevada.....	5	32,513,531	1,100,648	33,614,179	13,164,921	46,779,100
New Mexico.....	7	14,224,335	2,056,045	16,280,380	23,467,020	39,747,400
Oregon.....	7	12,368,244	917,227	13,285,471	7,061,029	20,346,500
Utah.....	11	21,323,487	2,608,888	23,932,375	13,555,425	37,487,800
Wyoming.....	5	13,479,638	1,225,654	14,705,292	7,800,808	22,506,100
Total.....	60	130,683,965	15,094,009	145,777,974	118,831,726	264,609,700

¹ Includes vacant, unappropriated, and unreserved public lands covered by rights-of-way, unpatented mining claims; lands unreserved except for mineral withdrawals for classification and lands unreserved except for Public Land Order No. 35 but which have not been classified as valuable for vanadium.

² Includes certain Federal lands in withdrawals administered under agreement with other agencies and non-Federal lands administered under Pierce Act leases and cooperative agreements.

³ Includes private, State, county, and certain withdrawn Federal lands which the Grazing Service does not administer.

TABLE III.—Cumulative summary of range improvement projects in grazing districts, 1935–45

Type of project	Unit	Completed fiscal year 1945	Total completed or acquired from April 1935 to June 30, 1945
Spring developments.....	Number.....	86	2,083
Reservoirs (stock water).....	do.....	520	3,467
Wells (stock water).....	do.....	45	824
Pipe and tile lines.....	Miles.....	7.25	63.25
Ditches.....	do.....	.8	58.5
Truck trails.....	do.....	342.1	10,516.6
Stock trails.....	do.....	83.8	1,680.4
Stock driveways.....	do.....	41	1,471.9
Bridges, livestock (over 20-foot span).....	Number.....	-----	69
Bridges, vehicle (over 20-foot span).....	do.....	7	112
Fences.....	Miles.....	390.3	7,136.6
Corrals and holding traps.....	Number.....	38	446
Cattle guards.....	do.....	50	736
Dipping vats.....	do.....	2	7
Telephone lines.....	Miles.....	4	380.7
Firebreaks.....	do.....	418	4,113
Boundary marking.....	do.....	322.5	4,729.5

Fish and Wildlife Service

IRA N. GABRIELSON, *Director*



THE FUNCTION OF THE FISH AND WILDLIFE SERVICE

THE central function of the Fish and Wildlife Service is to effect and maintain an equilibrium of our native animal resources that will be most profitable to the most men. Ever since European man first landed on this continent, the forces of progress—i. e., growth of the population of man, the development of industry, the expansion of cities, the spread of highways, the facilitation of contacts with the rest of the world—have all constantly worked and will continue to work to destroy that profitable equilibrium.

VALUE OF ANIMAL RESOURCES

It is well worth the struggle and expense we must make to oppose such negative results of progress, especially since we can do this without opposing progress itself. Our national resources of birds, beasts and fishes, with the conservation of which the Fish and Wildlife Service is concerned, are valuable far beyond what can be expressed in dollars and cents. But if money be set arbitrarily as the whole criterion of worth, there are the following estimates on the fraction of United States fish and wildlife resources that can be evaluated from quantitative knowledge:

Resource:	Capitalized value (billions of dollars)
Water fowl.....	1. 5
Fur-bearing animals.....	. 4
Big-game animals.....	1. 3
Commercial fisheries.....	5. 8
Game fishes.....	5. 0
Total.....	14. 0

If now we take into account the unutilized resources, and such benefits as are rendered fields and forests by the insect control activities of birds, for example, and all the imponderable values, such as beauty and recreation, the amount derived above is perhaps no more

than a tenth of the grand total, which may therefore conservatively be set at somewhere around 140 billion dollars.

EFFECT OF THE WAR ON ANIMAL RESOURCES AND ON CONSERVATION

Unlike the nonrenewable resources, our continental fish and wildlife have not, on the whole been adversely affected by the war. If anything, they have been benefited by it, since fishing (except for certain commercial species) and hunting have been below peace-time normals. Offshore wildlife, on the other hand, has suffered from the war. Many populations of birds and mammals which frequent the shore, the open sea, and the oceanic islands have been seriously decimated. Thousands of auks, murre, puffins, sea gulls, and ducks have perished from the effects of oil on the surface of the sea, which penetrates the feathers and ruins them as waterproof coverings.

The transformation of small islands in the Pacific from jungles to war camps has seriously diminished the abundance of sea birds requiring those islands for nesting sites, and has perhaps even extinguished at least two species, the Laysan Island rail and Laysan Island finch. The use of certain coastal islands for bombing practice has destroyed the nesting grounds of many birds frequenting our shore. Unknown quantities of whales, the most valuable animal in existence, have been killed in the course of submarine warfare. It will take at least 5 years of observation to determine the extent of these losses and to effectuate measures for recovery wherever the possibilities of recovery appear hopeful.

The most serious effect of the war on the conservation of our animal resources has been the loss of trained personnel by Federal and State agencies. This effect evidenced itself as soon as men began to be diverted to war occupations, several months before hostilities actually commenced. During the war years, so few young men were in a position to take the college training needed to turn out competent wildlife managers and conservationists that virtually none have been available for apprenticeship in the Fish and Wildlife Service. Consequently, there is now a wide gap between the beginning grades and those filled by such of the older, well-experienced men as have remained in conservation work during the war, and there are not enough of the latter to fill all the supervisory positions that will be required for vital post-war projects.

With an ever-increasing number of returned war veterans seeking to establish themselves in civilian life, there is the opportunity as well as the need for the Federal Government to encourage those suitably inclined to take the college training required for any of the several

phases of conservation practice. This means that the Fish and Wildlife Service must cooperate with the universities in establishing and maintaining at a high standard of excellence, the kinds of courses which will produce the most effective men in this field.

During the war, the Federal Government has assisted in the training of visiting foreign students by granting generous traveling fellowships, paying living expenses and tuition in schools with curricula in fishery or wildlife biology. It is proposed here that similar fellowships be made available to United States citizens of promise. The choice of subjects for study and life work is exceedingly broad, as will be shown in the following account.

REFUGES

Among the activities of the Fish and Wildlife Service, none is more effective in wildlife conservation and restoration than a Nation-wide system of refuges. These are lands dedicated wholly to the propagation of wildlife by good management practices. From a modest beginning in the early part of the twentieth century, the system grew slowly for many years; and in the 1930's it was given great impetus by the allocation of special funds and by passage of the Migratory Bird Hunting Stamp Act. This act, which requires every duck and goose hunter over 16 years of age to buy a Federal migratory waterfowl hunting stamp, has provided annual funds ranging from half a million to nearly a million and a half dollars. Of this money, 90 per cent must be used for enlarging and maintaining the system; the remaining 10 per cent is available for the administration of the act.

In the past year, six areas, totaling in size over a million acres, were established as national wildlife refuges. These were located in Washington, Missouri, California, Florida, North Dakota, and Kentucky.

During the war years, the refuges have been operated on a strictly maintenance basis. With two thirds of all refuge personnel in the armed services, with construction at a standstill, and with maintenance reduced to the very minimum, water-control structures, patrol trails, buildings, etc., are deteriorating. An extensive program has been prepared for the rehabilitation of many of these developments, and for continuation and completion of the continental waterfowl refuge program.

It is estimated that about 25 percent of the ducks, geese, and swans in North America inhabit these Federal refuges. The value to the people of the United States in having these resources protected from the critical danger of extermination and in having them maintained in areas where conditions are most favorable to restoration, is estimated to be worth about 3 million dollars annually. The value of maintaining all of the other forms of wildlife in these areas—the non-

game birds, the mammals, the fish—cannot be measured from any quantitative basis, may amount to as much as an additional 3 million dollars annually.

FEDERAL AID TO STATE CONSERVATION AGENCIES

Of equal benefit to wildlife conservation has been the Federal Aid to Wildlife Restoration Act of 1937, designed primarily to increase and improve conservation work by the States. Under the terms of this act, the Federal Government may pay a grant to any State which has enacted certain legislative measures to promote conservation. This grant contributes 75 percent of the cost of work performed on approved projects concerned with the purchase and development of lands, the restoration of natural environment, and the prosecution of research into problems of wildlife management. The source of this money is the revenue from the tax imposed on firearms, shells, and cartridges. The amount thus collected is set aside in a special account, known as the Federal Aid to Wildlife Restoration Fund. The amount unused in any year may be left in the fund for future use.

As a consequence of wartime shortages of personnel, equipment, and materials, this program has proceeded on a greatly reduced scale during the last 4 years. Last year, for example, the total Federal grant was only \$900,000—the lowest to date; and by June 30, 1945, nearly \$11,000,000 had accumulated in the fund.

Judging from experience after the First World War, it is anticipated that the number of hunting licenses sold will increase by about 30 percent during the next few years, and Federal and State programs of wildlife management will have to be intensified accordingly. The International Association of Game, Fish, and Conservation Commissioners at its June 1945 meeting in Chicago passed a resolution favoring the appropriation of the aforesaid accumulated funds over a 5-year period, in addition to the regular annual deposits put into that fund.

EFFECT OF DDT ON WILDLIFE

World War II has brought into production and use a new insecticide known popularly as "DDT," dichloro-diphenyl-trichloroethane. This potent material has been used widely by the Army and Navy for control of pest- and disease-carrying insects in war theaters, chiefly in the Pacific. Unfortunately DDT has been found to be an unselective poison. It may kill, under certain conditions, a great variety of animal life, including birds, reptiles, and amphibians; and preliminary indication of this from laboratory tests has led to intensive studies to evaluate the damage that may result to wild animal life when forest, marsh, and agricultural areas are sprayed with DDT solutions. The

Bureau of Entomology and Plant Quarantine of the United States Department of Agriculture has recognized the potential hazard in widespread use of DDT and has entered into a cooperative agreement with the Fish and Wildlife Service to aid in appraising the biological consequences of applying it. Various types of applications in various concentrations have been tried on experimental plots, some of which have been as large as 3,000 acres. Biologists of the Service are now intensively studying the effects of these experimental treatments on fish, birds, mammals, and other vertebrates. The objective of these studies is to find out what doses and formulae can be used with minimum damage to fish and wildlife.

PEST CONTROL

DEVELOPMENT OF A NEW RODENT POISON

Notable progress was made during the year in the search for new rodenticides through the development of a compound which already has become widely known under its laboratory serial number, "1080." This material, sodium fluoroacetate, is extremely toxic to rodents as well as to certain other mammals and birds. It is readily soluble in water, has only a slight taste in the dilutions in which it is commonly used, and lends itself well to most of the methods used in bait preparations for domestic rats and mice and for field rodents.

In the Southern States "1080" already has made an excellent record in the experimental control of Norway, black, Alexandrine, and frugivorous varieties of rats.

There still remain many aspects of the use of "1080" to be investigated. Its high toxicity portends possible dangers not only to persons who handle it but also to beneficial forms of wildlife that might be endangered in its field application. Studies are being pressed to the limit of available personnel and with the generous help of cooperators throughout the country, as well as of members of the armed services engaged in problems of rodent control abroad.

Correlated with the search for new rodenticides has been the continued effort to make the use of poisons as safe for beneficial or harmless wildlife as is humanly possible. Research is in progress in the use of color to make rodent bait unattractive to seed-eating birds without impairing its attractiveness to rodents. Results so far appear promising and already are being given practical application in field operations.

RED SQUILL

At the close of the fiscal year the national and international situation with respect to red squill, the source of the most important rodenticide for domestic use, was materially improved over that of a

year ago. Thanks to numerous importations from the Mediterranean, the stock pile of squill in this country was increased to approximately a million pounds. Not only did the importations exceed in poundage those of any previous year, but the quality of the raw chips received was superior to that obtained in other recent years. Much of the material revealed a high enough toxicity to permit a reduction in the price of fortified squill. Determinations of the toxicity which led to these developments were made largely in the laboratory of the Fish and Wildlife Service. Samples imported from Italy were found to be comparable in toxicity to those from Algeria, whereas samples from Spain proved, as in former years, to be wholly nontoxic.

PREDATOR CONTROL

Meanwhile, the Fish and Wildlife Service has continued its program of organized hunting throughout the country for the reduction in the abundance of coyotes. This work is carried on primarily to reduce predation of livestock. During the past year, however, an epidemic of rabies among dogs, coyotes, and foxes has necessitated an intensification of this program.

The Service has also contributed greatly to the suppression of typhus, a disease endemic in the South, through its rat control work, carried on in cooperation with the States.

DEVELOPMENT OF THE RABBIT INDUSTRY

The shortage of meat during the war stimulated the development of a rabbit industry, which now gives evidence of continuing growth in the future. This new industry owes a considerable part of its success to the work of the Fish and Wildlife Service Rabbit Experimental Station at Fontana, Calif. There research is carried on to improve methods of managing, feeding, and breeding rabbits; and the results of these studies are made available to the public in a series of booklets. As a result of this research, domestic rabbits now outclass their ancestors of 10 or 15 years ago. They have better meat, finer fur, are more economical to feed, less subject to disease, and breed more true to color, size, and shape.

Small business characterizes the United States rabbit industry, most of the meat, fur, and wool being produced in small rabbitries whose owners devote only part of their time to the project. The amount of meat produced is impressive, being somewhere between 15 and 20 million pounds in 1944.

ALASKA FUR SEALS—AN EXAMPLE OF A WELL-MANAGED RESOURCE

One of the finest living examples of an animal resource that was once depleted by imprudent exploitation and restored by good management is the Pribilof Islands (Alaska) fur-seal resource, over which the Fish and Wildlife Service has jurisdiction. Virtually unaffected by the war, the fur-seal herd has continued to yield close to normal returns.

The fur-seal industry, estimated to be worth \$100,000,000, has returned nearly \$20,000,000 as net proceeds to the Treasury since 1867. From a low of about 130,000 seals in 1910, the herd has been restored through wise management practices to 3,000,000 animals, and is providing the Government with an annual net income of over a half-million dollars.

Rehabilitation of the 500 inhabitants of the Pribilof Islands, who were returned to the islands in May 1944, made possible the resumption of fur-sealing and related activities upon a normal basis. Sealing operations, however, were somewhat disappointing; the herd as a whole was late in arriving at the islands after their customary winter sojourn to the South. Furthermore, for some reason yet to be discovered, the 3-year-old males, the class from which nearly all killings are made, did not haul out in normal numbers, and the resulting take of 47,652 skins was less than anticipated. Other elements of the herd, however, appeared in usual numbers.

Of the sealskins taken, 20 percent, or 9,530, were delivered to a representative of the Canadian Government at Seattle, Washington, in accordance with the Provisional Agreement of 1942 between the United States and Canada, and the remainder were sent to the Fouke Fur Co. at St. Louis, Mo., for processing and sale.

During the year two public auction sales were held at St. Louis for the account of the Government. At the auction held October 9, 1944, 22,393 dressed and dyed skins, and 169 unfinished skins were sold for a total of \$823,500.75.

On April 9, 1945, there were sold at public auction 22,682 dressed and dyed Pribilof Islands sealskins and 4 confiscated sealskins for a total of \$811,992.75. In addition, there were sold at private sales or promotional purposes under special authorization, 214 dressed and dyed skins for \$8,467.50. All of the sales were made at ceiling prices established by the Office of Price Administration.

THE MENACE OF POLLUTION

The distribution of all animals is controlled by the distribution of water. Even the most desiccated looking desert creatures, whose bodies are magnificently adapted to living in dry climates, cannot live permanently without it. Furthermore, each kind of animal depends for its living on a particular water habitat. Desert-dwellers cannot live in marshes; marsh-dwellers cannot survive in open lakes. Any change, however slight, in the water or the environment surrounding it affects the animal populations depending on it. But the progress of industrialization in the United States depends on the distribution of water. For various reasons, industrial centers tend to become established close to large rivers, or bays on the seacoast; and from the beginning, they have defiled those rivers and bays with sewage and factory wastes. The effect on animal resources has been so wastefully destructive that pollution is now one of the most serious and complex of conservation problems occupying the attention of the Fish and Wildlife Service.

The Service has for the past 10 years carried on a series of experiments in various parts of the country to establish minimal standards of water purity necessary for the support of aquatic life. The information is required as a basis for effective control measures. It has been established that stream pollutants, regardless of their source, can be grouped into three classes: those which disturb the balance and general conditions of nature required to maintain aquatic life; those which have specific toxic action on fish or other aquatic life; and those which combine both hazards.

The first group includes various effluents, both municipal and industrial, which reduce the dissolved oxygen, alter the acid-base balance of water, increase turbidity and reduce light penetration, blanket the bottom with unproductive materials, or otherwise disturb general stream conditions. The second and third groups may be considered together because of the common hazard of toxicity to living things. In these groups are various metallic poisons, dyes, organic compounds and sulfur derivatives, noxious gases such as chlorine and methane, and compounds like cyanids which enter streams as by products or wastes from numerous types of manufacturing activities.

During recent years effluents of these types have been increasing in quantity and have been introduced into new areas as a result of the expansion and dispersion of industry of all types, particularly war-munitions manufacture. To an already long list of known harmful wastes known to be harmful to aquatic life have been added many new kinds and additional quantities of harmful wastes from explosives plants, rayon mills, and synthetics manufacture. Not only has

quantity of waste materials increased from these processes, but, under the pressure of war, and with the shortage of materials for the construction of treatment and purification equipment, less attention has been given to either the recovery of useful and valuable byproducts, or to the treatment of harmful wastes for which no profitable market has been found.

It is extremely difficult to establish national standards of water purity necessary to safeguard aquatic resources. Experiments conducted by the Fish and Wildlife Service over many years have demonstrated that even the lethal limits of many specifically poisonous substances cannot be defined. This is because slight changes in the acidity or salt content of water, the dissolved oxygen, and the natural ability of water to neutralize acids, will materially alter the toxicity of many compounds. Copper sulfate, for example, was found to be toxic to most fish and aquatic animals in the water of one stream even when diluted with 4 million parts of pure water, while in another stream a concentration four times as great was readily tolerated by the same species because of differences in the amounts of other dissolved salts carried by the two streams.

Instead of being subject to uniform Nation-wide standards of water purity which government and industry could apply confidently, each stream or river basin presents individual problems which must be studied on the ground. Pollution abatement practices must be developed for each particular situation if our aquatic resources are to be protected.

Thus pollution is controllable only on local and State levels. At the same time, it is a national problem and it is the duty of the National Government to furnish guidance for the abatement of this nuisance. During the past year, the Fish and Wildlife Service has compiled the results of its long study on this subject in a bulletin entitled, "The Determination of Water Quality." This work, now in press, is designed to serve as a guide to those engaged in pollution control.

EFFECT OF WATER UTILIZATION PROJECTS ON ANIMAL RESOURCES

During recent years, a movement has been gathering momentum to develop all the inland waterways to their fullest extent, so as to utilize, by means of systems of dams, the flow and gradient of each river and its many tributaries to serve the purposes of navigation, irrigation, power and flood control. Although this development will undoubtedly proceed over a long period of time, a number of major constructions are planned to be under way in various parts of the country within the next five years.

The Fish and Wildlife Service is one of several Government agencies that are working together to achieve the maximum national benefits from these projects. Its particular function in this respect is to devise means of minimizing the inevitable damage which animal populations living around the affected water courses must suffer when their environment is changed. Like the pollution problem, no rules or principles exist or could ever be devised to solve the conservation problems of all water-use projects. When a single dam is considered by itself, it is usually possible to devise modifications that will help a migrating fish population like salmon to surmount it with no serious losses. When one dam is followed by a succession of others, blocking the upper reaches of a stream where the spawning grounds are located, the conservation problems become acute indeed.

An example of such a situation is the Columbia River, where a vast system of water-use projects is under development. One unit of this system is the Bonneville Dam, completed in 1938. Scientists of the United States Bureau of Fisheries (now part of the Fish and Wildlife Service) effected the safe passage of salmon over this dam by means of "fish ladders"; that is, a rising succession of pools, which the fish can easily traverse. A second unit of this system is the Grand Coulee Dam, which is too high for the salmon to surmount by any device. Here the fish were trapped and thence hauled overland by truck to tributaries below the dam. This bold experiment was attempted for the first time in 1944. The salmon were transplanted according to plan, they ascended the tributaries into which they had been introduced, and spawned successfully; and their young, guided by the memory of their infant experience, will return naturally to their adopted tributaries.

Getting the young salmon downstream with minimum mortality is another problem to be solved. Experiments designed to determine the extent of the mortality of downstream-migrating juvenile salmon in passing Bonneville Dam were continued by the marking of fingerlings and liberating them above and below the dam. Returns to date indicate considerable variation in mortality, ranging from 5 to 50 percent, and further studies are needed on the subject.

Meanwhile, special attention is being given to the various water-use projects proposed for the Columbia River Basin and their probable effect on the fishery resources. Ways and means of successfully caring for the fish at each structure or series of structures are being devised. A vastly expanded program of investigations has been formulated to obtain information necessary for the maintenance of the fishery resources under the proposed new conditions and preliminary studies are under way.

A similar plan of salvaging salmon at the Shasta Dam in California has been seriously hampered by the war. Because of a shortage of

materials and manpower, fish trapping facilities could not be in readiness in 1943 when the spring salmon were blocked by Keswick Dam. Operations did not start until June 1 of that year and many of the salmon died below the dam. The effect of this delay in trapping and transferring the accumulated salmon will not be known until 1947, but it is certain that a portion of the spring run was lost. Such losses are extremely important, especially since the Sacramento River salmon fishery will have to be managed very intensively to achieve results comparable to those existing before the construction of Shasta Dam. It is estimated that the salmon maintenance program below Shasta Dam will be worth \$2,000,000 per year to the fishing industry.

The second full year of operation of the Shasta salmon salvage program was considerably better than the first. Permanent equipment and facilities eliminated many of the difficulties of the previous year. The chinook salmon run into that portion of Sacramento River within the salvage area during 1944 was greater than had been anticipated.

ARTIFICIAL PROPAGATION OF FISH

From the Service hatcheries, fish and fish eggs totaling 5.7 billion valued at about \$3,000,000, were released in the Nation's streams, lakes, and salt waters.

With the beginning of the war these activities were adjusted to place special emphasis on propagating the species of fish that contribute most to the food program. Among these were the salmons of the Pacific coast and the warm-water fishes which are used in stocking farm ponds. While the total output of fish and fish eggs from Federal hatcheries for the calendar year 1944 was slightly less than in 1943, there were increases in the production of commercially important chinook, silver, and sockeye salmons. The demands for spiny-rayed fishes, especially largemouth black bass and bluegill sunfish (the two species that have proved most useful in stocking farm ponds) surpassed production; for during the last half of the year the number of requests for fish with which to stock ponds was over 200 percent higher than in the comparable period of the previous year.

ALASKA FISHERIES

In Alaska the Fish and Wildlife Service exercises direct jurisdiction over the animal resources. In order to obtain the information needed for effective management of the fisheries, scientific studies of fish biology are in continuous progress. Under wartime conditions, lack of facilities and of trained personnel have resulted in these investigations being conducted on such a restricted scale that only a minimum of information has been obtainable in recent years.

CONSERVATION OF RED SALMON

Management of the red salmon fishery in Bristol Bay to insure a continuing high yield requires that enough fish escape the fishery to keep the population continually reseeded. To accomplish this, certain restrictions are imposed on the fishery, based on estimates of the probable size of run into each river system. During the past year, collections of catch records were maintained, and aerial surveys were again carried on over the entire Bristol Bay watershed to establish the magnitude of the run into each river system. This was done so as to determine whether or not the regulations limiting the catch were effective and also to provide a basis for estimating the probable return into each system when the progeny of this escapement have matured. As a part of this program a counting weir was again operated at Brooks Lake on the Naknek river system where an accurate count of the escapement into that portion of the watershed could be obtained.

At Karluk River, important in the production of red salmon, the catch is not permitted to exceed the escapement of spawners into the river. In order to effectuate this requirement, records of the catch in the area were maintained, and a counting weir was operated to obtain an accurate count of the fish entering the system to spawn. Surveys of the several tributaries to the Karluk Lake were made to evaluate the degree of utilization of spawning gravels.

In addition, the age composition of the stock was estimated by sampling the commercial catch. These data were used to calculate the ratios of return to escapement, information essential to determining what constitutes an adequate escapement and to predicting the magnitude of future runs.

CONSERVATION OF PINK SALMON

Studies of pink salmon in southeastern Alaska continued on a reduced basis. At the Little Port Walter Biological Station studies of the rate of infant survival were maintained, including annual counts of the spawning adults in the fall and of their progeny which migrate downstream in the spring. An unbroken series of these data are of primary importance to an understanding of the fluctuations in abundance which occur in this species.

CONSERVATION OF ALASKA HERRING

The value of the conservation policies employed in the Alaska herring fishery is demonstrated by a further increase in yield during the past year. A total of 107 million pounds were produced in 1944 as compared to 84 million in 1943 and 38 million in 1942.

Catch quotas, based on estimates of abundance in the coming season, were established for each of the three principal fishing districts.

Because the year broods produced in 1939, 1940, and 1941, which would support the fishery in 1944, were known to be above-average in abundance, an increase in quotas was recommended. Everywhere higher catches per fishing day and a higher total catch than in any of the past several years, corroborated these predictions. From mortality studies it is known that these same year broods, properly utilized in accordance with conservation principles, may be expected to survive in significant numbers through their ninth year of life. Under these terms there is promising evidence that this fishery may eventually be stabilized at an even higher abundance level.

CONSERVATION OF ALASKA SABLEFISH

An investigation of the sablefish of southeastern Alaska has revealed that a serious decline in abundance of this species has occurred. The return per unit of effort in 1944 was less than 40 percent of that which was obtained a decade ago. In spite of this low return, the incentive of high price has served to increase the fishing intensity, thus further reducing the abundance. As a step toward the rehabilitation of this resource, a closed period, intended to reduce the fishing intensity, was imposed in 1944.

MANAGEMENT OF OYSTER RESOURCES

From the viewpoint of conservation, oysters are peculiarly interesting because they can be cultivated like agricultural commodities, and their abundance and quality can be controlled with all the exactitude of properly run business enterprise. The development of oyster farming methods in the United States is an achievement of the Fish and Wildlife Service. The constant improvement of these methods is an important part of the Service program.

The war years have imposed severe hardships on the oyster industry. Shortage of manpower, difficulties of keeping boats in repair, military restrictions on oyster-producing areas, increased sewage pollution in regions where populations of war workers have flourished, have all tended to depress oyster production. For example, in the Hampton Roads area, the extent of pollution caused public health authorities to close planted grounds containing 2.6 million dollars' worth of market-sized oysters. This action led the Fish and Wildlife Service to conduct special bacteriological studies to determine the trend of pollution and the direction of its spread in the lower part of the bay. These studies have demonstrated that temperature and weather influence the bacteriological quality of water to an important degree; and they proved the necessity of partial purification, at the very least, of all sewage before it is dispersed in the bay.

Previous studies of the Service clearly demonstrated the need of

managing public oyster grounds for their conservation and development. In cooperation with the Maryland Department of Tidewater Fisheries, the Fish and Wildlife Service conducted intensive ecological observations on the principal public reefs in the Maryland part of the bay. From field observations, the time of spawning and setting, the rate of growth, the size composition of the oyster population, and the quantity of oyster pests were determined. These data, summarized and analyzed, were made available to appropriate State officials with recommendations regarding opening and closing of grounds, time of planting shell, methods of controlling oyster pests, and other information pertinent to a well-operated program of State management. In accordance with these recommendations, grounds which had been closed to the fishery were reopened for a limited period. At a time when protein food was scarce, this action contributed an additional 640,000 pounds of oyster meat to the market. It also added \$400,000 to the income of oyster growers. This was done without in any way damaging the potential productivity of the reefs.

CONSERVATION OF MARINE FISHERY RESOURCES

The great sea fisheries along the United States coasts have provided the Nation with an average of 4.2 billion pounds of food annually during the war. The biological study of these resources, to determine the facts needed to utilize them to their fullest capacity in accordance with conservation principles, is one of the major activities of the Fish and Wildlife Service.

THE HADDOCK

Among the most valuable marine fishes is the haddock, which yields an annual catch worth about 9 million dollars to American fishermen. This species has shown evidence of declining abundance on the principal New England fishing grounds which supply the bulk of the catch. Preliminary analysis of abundance indices, size, and age data show that the 1941, 1942, 1943 year classes on Georges Bank were relative failures. This caused some reduction in yield during 1944, which will become increasingly serious in 1945 and the first part of 1946. Various factors responsible for the failure of these year classes are being evaluated to determine the best way to make use of available stocks and, if possible, to prevent a recurrence of such a series of failures.

FLOUNDERS

The flounder stocks yielded a catch worth nearly 4 million dollars in spite of a serious decline in the production of the yellowtail flounder, which furnishes the major part of the flounder catch. Research efforts were concentrated on the collection of data covering the pos-

sible factors causing the decline. Analysis of the changes in the density, age, and size composition of the populations have been started, making use of age determinations from the scales and other techniques worked out during the past year.

ROSEFISH

Production of rosefish continued at a high level with a catch worth about 4½ million dollars, coming principally from Northern Gulf of Maine and Eastern Nova Scotian Banks. Study of fish scales and length composition showed that in both of these areas growth is very slow, the fish reaching a length of less than 9 inches in 10 years. After the first 1 or 2 years, growth is only 0.6 to 0.8 inch a year. Most of the fish do not mature until they are more than 9 inches in length. Accurate age readings for the older fish have not yet been established. In spite of the concentrated and intensive fishery there have been no striking changes in the average catch-per-day, but this appears to be the result of increased efficiency of fishing operations rather than to the maintenance of the fish populations at a constant level.

LOBSTER

The lobster catch, particularly that in Maine waters, has increased greatly since 1940; the 1944 landings in that State alone totaled about 14 million pounds and brought the fishermen about 4¾ million dollars. Analysis of the size composition of the lobster population has shown that, in part, this increased catch is the consequence of the increased size limit, in effect since 1942.

ATLANTIC SALMON

Studies on Atlantic salmon were limited to continuing the marking and stocking experiments begun in 1942. This program was designed to evaluate the various factors involved in restoring salmon, and to prepare for an expanded program in 1946. A total of 94,000 Atlantic salmon of various ages were planted during the year in the St. George and Penobscot Rivers; and 32,000 silver salmon from the Pacific coast were planted in the Pemaquid and Ducktrap Rivers.

CONDITION OF STOCKS OF FISH ON NEW ENGLAND BANKS

At the close of the fiscal year, most of the stocks of fish on the New England Banks, which during 1944 yielded the fishermen well over 40 million dollars, were in relatively good condition (compared to their prewar status), except for yellowtail flounders, Georges Bank haddock, and possibly a few others. However, the great increase in the fishing fleet during the past year will put an unprecedented drain on these stocks of fish.

PACIFIC PILCHARD

During the middle 1930's pilchard fishing along the Pacific coast was intensified through growth of the fleet of large purse seiners, increasing the exploitation $2\frac{1}{2}$ -fold and doubling the yield. For the 9 years of this high-fishing rate a fairly stable yield has been maintained by self-renewal. Biological work of the Fish and Wildlife Service has proved that this depended largely on sea conditions favorable to reproduction and survival of young for a number of seasons prior to 1940, and has suggested that during more recent years (1940-43) less favorable renewal conditions prevailed. Because the young from these years have not yet reached commercial maturity the full effect of these circumstances are not yet discernible. It remains to be seen whether this great biological resource yielding more than one half million tons of fish annually can hold up under the combination of moderate or poor reproductive conditions with the present high fishing rate. Unfortunately the research on this and related questions has been materially retarded during the last two years through cessation of sea work and diversion of personnel to war-emergency activities.

PROMOTION OF UTILIZATION

Conservation is concerned as much with the proper exploitation of animal resources as it is with their protection, since they have their maximum value to us only when they are fully utilized. It is one of the functions of the Fish and Wildlife Service, therefore, to promote the fullest utilization of the fishery resources. This it does by collecting and disseminating statistical and economic information, by carrying on research to improve techniques of catching and processing fish, and by working to enlarge markets for fishery products.

STATISTICS ON PRODUCTION

To serve the daily commercial needs of the fishing industries, the Fish and Wildlife Service collects current information on landings of fish at the various ports, on the volume of stocks held in cold storage, on shipments from producing areas, and on prices in central markets. Thus fishermen on Long Island, in North Carolina, or in Florida, for example, are given a basis for judging the demand in New York City, Boston, or Chicago. Likewise distributors in those cities are apprised of shipments of salmon and halibut from Seattle and Prince Rupert, or of shrimp from Biloxi, long before the shipments arrive. This service is designed to expedite trading and to obviate commercial gluts and famines.

During the war years this market news service was augmented by complete coverage of war orders issued by the Office of Price Admin-

istration, War Production Board, War Food Administration, Office of Defense Transportation, and other agencies whose activities affected the fisheries. Special issues of Fishery Market News, a periodical issued by the Fish and Wildlife Service, were devoted to listing O. P. A.'s maximum fish prices, and were used continuously by fish merchants throughout the war.

RESEARCH ON TIN SUBSTITUTES

Early in the war, the shortage of tin plate forced manufacturers of metal food containers to use substitute metals, chiefly various steel plates. These were treated chemically or with lacquers to prevent corrosion when packed with fresh or processed food products. An important project of the Fish and Wildlife Service, then, was to test these wartime containers by actual use. Results of these tests, which were performed on a wide variety of materials, were used as a basis for action in fish processing plants. Our technologists also tested fiber containers which were treated with such waterproofing materials as paraffin wax and beeswax. From these studies, recommendations were made to the fishing industry on types of materials found suitable for the transportation of fishery products.

RESEARCH ON METHODS OF SAMPLING FISH LIVERS

Early in the experimental work on vitamin-A rich shark livers, Fish and Wildlife Service technologists found that within the liver of each fish there is wide variation in the percentage of oil and in the vitamin-A potency. The earliest method of sampling for the determination of vitamin-A potency, which is the basis of the selling price, consisted of cutting sections from the liver. This method was inadequate, since a slight variation in the amount of oil contained in the livers would entail a considerable loss either to buyer or seller, depending on the direction of the variation. It was obviously necessary to devise a sampling method which would more accurately represent the total oil and vitamin content. This was a problem undertaken by the Fish and Wildlife Service at its Seattle laboratory. Extensive study and tests produced a device which takes a core sample down through the 5-gallon can containing the liver, and obtains quickly a sample representing the entire contents of the can with 95 percent accuracy. This device, now being patented under a public patent, is in wide demand by vitamin processors.

DEVELOPMENT OF QUICK-FROZEN PRECOOKED FISHERY FOODS

A newly developed product which promises to modify our living habits in the future is frozen, packaged cooked food. This has found wide use during the war for serving on board transport planes and in battle areas where it was not feasible to set up kitchens. Not all

cooked dishes remain palatable when frozen. Some mixtures become undesirably tough and leathery; hence special recipes must be developed. In response to a request from the Army Quartermaster Corps Subsistence Research Laboratory, the Fish and Wildlife Service developed a large number of recipes utilizing fishery products which are suitable for freezing.

The results of some of these tests have been published and others are being prepared for publication. Meanwhile, several commercial fishery firms are marketing precooked, packaged, frozen fishery products.

MARKET DEVELOPMENT

At the end of August 1944, cold-storage warehouses throughout the country were stocked to capacity, fishery products alone amounting to a record total of about 123 million pounds. Army food authorities expressed concern over the situation and sought assistance in relieving the storage glut so that space for Army food stocks would be freed.

The Fish and Wildlife Service, in cooperation with the War Food Administration, immediately sponsored, planned, and executed eat-more-fish campaigns in several eastern cities. In these campaigns, which lasted 2 weeks to 1 month, posters, newspapers, radio broadcasts, car cards, and other media were utilized. Recipe books, leaflets, and bulletins containing marketing information about fishery products were distributed.

At the conclusion of the campaigns, fish dealers and retail food stores reported increases in sales amounting to 10 to 70 percent over previous similar periods.

VALUE OF THE FISH AND WILDLIFE SERVICE

In the foregoing pages, it has been shown by a series of illustrations that the Fish and Wildlife Service enlarges national wealth through a variety of activities. To summarize these in general terms, the Service:

- Increases the stocks of fish and of wildlife;
- Resists depletion of our animal resources;
- Enlarges knowledge about them;
- Improves and extends the use of them.

It is obviously as difficult and elusive a problem to evaluate these effects in dollars and cents as it is to evaluate the resources themselves. Yet an estimate has been made from such quantitative sources as are available. This estimate places on the total of these activities a value in the order of 30 million dollars a year.

Office of the Coordinator of Fisheries

IRA N. GABRIELSON, *Deputy Coordinator*



AMERICA'S fishery resources have emerged from the strain of war as a vital element in the national life. During the period of hostilities they have been called upon to make large and essential contributions to the war program. This they have done. And not only have the Nation's aquatic resources provided, in larger quantity than was thought possible, the protein foods, vitamin oils, and numerous industrial materials needed for war, but they have been maintained in essentially sound condition and now stand ready to play new and increasingly important roles in the postwar period.

Likewise, the condition of the industry which makes these resources available to the Nation is good. In sharp contrast to the difficult days of 1942, when the fishing fleet had been crippled by the unavoidable requisitioning of 700 of its finest vessels for military operations, the industry now has the largest and most efficient fleet in its history. Some of the recent inventions and discoveries in the fields of science and engineering have already become part of the equipment of these boats; other developments, hitherto withheld from commercial use for security reasons, will soon become available and will give the fleet a vastly extended range and adaptability.

The part played by the Office of the Coordinator of Fisheries in bringing about the favorable condition of our aquatic resources and of the fishing industry now may be recorded in full.

The primary task which was assigned the Coordinator's Office upon its establishment in 1942 was that of restoring and maintaining the productive capacity of the fishing industry.¹ That capacity had been badly shattered by the events of the first months of war. Yet if fish, shellfish, seaweeds, and other aquatic products were to be produced in quantities at least approximately equivalent to the wartime need, the facilities of the industry had to be restored and maintained at a high level.

¹ The Office of the Coordinator of Fisheries was established by Executive Order 9204, July 21, 1942. Under the original order it was authorized to coordinate fishery policies, plans, and programs; this broad directive was later considerably extended and clarified by Food Directive No. 2, issued by the Secretary of Agriculture on February 8, 1943, under which the Coordinator of Fisheries received specific authority over the production of fishery products.

In all efforts to achieve adequate production, however, it was essential to guard against reckless squandering of our resources for a short period at the expense of the future. When the Coordinator's Office undertook its task, no one could foresee within even approximate limits how long the war would last. The fisheries are a renewable but exhaustible resource. The lessons of the last war were fresh in the minds of fishery administrators. At that time the valuable Alaska salmon fishery was overfished to provide a quick supply of food, and thereby suffered damage which has been repaired only after years of effort. The Coordinator's Office therefore adopted, and consistently maintained, the policy of protecting the fishery resources against excessive drains which would endanger their continued productivity, not only for whatever period the war might continue but in future years as well. In carrying out this policy, the Coordinator's Office opposed the removal or relaxation of conservation regulations for the sake of immediate, short-term benefit when it was believed that the permanent public interest would suffer thereby. The satisfactory condition of the fishery resources after 3½ years of war is evidence of the wisdom of this policy.

PROVIDING THE MACHINERY OF PRODUCTION

While protecting the basic soundness of the fishery resources, the Coordinator's Office assisted the industry to build up its machinery of production. The fishing fleet had been reduced to critically low levels immediately after the entrance of America into the war. By the summer of 1945 it had been restored to its full prewar size, and its efficiency had reached the highest point in the history of the industry.

The rebuilding of the fleet was accomplished by authorizing construction by the industry of more than 2,000 new fishing craft and by demonstrating to the Army and Navy the need for the return of as many as possible of the vessels that had been requisitioned for military service early in the war. Working in close cooperation with the War Production Board, the Coordinator's Office arranged for adequate quotas of gasoline and Diesel engines to provide power for newly constructed vessels and replacements in old vessels. In addition, it assisted in providing engines and motors of various types, pumps, refrigeration equipment, and machinery for canneries and other shore plants.

In connection with the building program and with repairs and replacement of fishing equipment, the Coordinator's Office arranged for allotments of controlled materials, including steel, copper alloys, and aluminum, at the average rate of \$10,000 worth of materials per vessel (for the period from May 1943 through June 1945) or a total of more than 9 million dollars' worth of materials.

Of the 2,002 vessels that had been authorized for construction by June 30, 1945, many were already fishing at that time and all but 85 were scheduled for completion by the end of 1945. In only a few classifications of vessels—notably tuna clippers and large New England otter trawlers—was the fleet still below the prewar level at the end of the fiscal year 1945. The tuna clippers were necessarily among the last to be replaced by new construction and by June 30, 1945, none had been returned by the military services. These vessels, which are among the largest and fastest of the fishing boats, require an especially large amount of materials and equipment.

About a fourth of the new vessels are shrimp trawlers, for use in the major fishing industry of the South Atlantic and Gulf Coasts. Because of the greater range and modern equipment of these new boats, the efficiency of the shrimp fleet has been greatly increased.

Many large otter trawlers, especially from the New England fleet, were requisitioned for war service. They proved so valuable for military purposes that some are still retained. However, the new medium trawlers and draggers replaced them so effectively that many records for production were broken early in the 1945 season.

Throughout the entire war period, the situation with respect to nets, hard-fiber twine, and cordage remained tight. Requirements of netting for camouflage purposes were heavy. By careful surveys of the needs of the various fisheries and scheduling of orders well in advance of the fishing season, it was possible to avert any major shortage of fish nets which would have interfered with production.

THE MANPOWER PROBLEM

The manpower shortage, both of fishing boats and in fish-processing plants, was acute throughout the war, becoming progressively more serious as more and more of the highly skilled fishermen were refused deferment. Through its membership on the Inter-Agency Committee the Coordinator's Office was able to demonstrate the irreplaceable status of some of these men, whose skills had been attained through long experience and whose knowledge was indispensable to the effective performance of the fishing boats. Deferment was obtained for some captains and mates, even in the younger age groups. While in general it was possible to recruit enough crew members to keep the available boats in operation, there were isolated instances where boats remained idle because there were no crews to man them. In the food-processing plants, the shortage of workers was so acute as to act as a brake on production at various times and places, especially in the sardine canneries of both the Atlantic and Pacific coasts.

PRODUCTION PROGRAMS FOR THE MAJOR FISHERIES

Throughout the greater part of the war period, the salmon and pilchard fisheries, which together produce about one-third of the total poundage of fish taken in the United States, operated under production programs administered by the Office of the Coordinator of Fisheries. The Alaska salmon fishery operated under such a program in 1943, 1944, and 1945. The much smaller salmon fishery in Puget Sound was placed under a similar program in 1944 and 1945. The pilchard production program under the direction of the Coordinator's Office was undertaken in 1943. These programs enjoyed the active cooperation and approval of the great majority of the fishing industry which each season requested the continuation, and in some instances the extension, of the programs.

ALASKA SALMON INDUSTRY

The production program applied to the Alaska salmon industry, the operating units of which are scattered over vast distances of the Territory, was in effect a consolidation which brought about a pooling of the available resources of manpower, boats, and canning equipment. This was done by concentrating the canning of salmon at certain key centers, and providing for the joint utilization by the various firms of the available facilities of production.

The consolidation was made necessary by the fact that the armed forces had taken over a large percentage of the tenders and power scows used by the industry in Alaska waters and also because not more than 50 or 60 percent of the normal supply of labor was expected to be available.

The concentration order for the 1943 season provided for the canning of the year's catch in 74 (later increased by amendment to 77) of the largest and most modern plants rather than the 120 plants previously used, and reduced the number of lines of canning machinery from 226 in 1942 to 131, with provision for maximum use of the high-speed machines.

The concentration program was designed to accomplish: (1) A reduction in manpower requirements by about 5,000 persons; (2) reduction of north-bound passenger accommodations by approximately 4,000 persons; (3) reduction in north-bound tonnage by 17,742 tons; (4) reduction in floating equipment by 86 tenders and 50 scows; (5) reduction in fishing apparatus by 48 traps, 25 purse seiners, and 67,130 fathoms of gill nets.

The program was considered so satisfactory that at the close of the 1943 season representatives of the salmon industry requested the Coordinator of Fisheries to take immediate steps toward a continua-

tion of the plan in 1944. It was felt that the consolidation had saved the industry from becoming involved in ruinous competition for labor, transportation space, and equipment. As a result of its operation, the industry was able to increase its production of canned salmon, even though operating fewer plants, with less labor and less equipment than it would have used under normal conditions.

Because the situation, especially with respect to boats and equipment, had eased somewhat by the spring of 1944, the concentration program for that season was more liberal than that of 1943 in that it authorized the operation of 89 plants compared with 77 the previous year. Other important changes in the 1944 order were the assignment of manpower quotas to the various canneries, the quotas having been established previously by the War Manpower Commission. The 1944 order also provided that all persons, companies, and corporations authorized under the terms of the order to engage in salmon canning must obtain a license from the Fishery Coordinator.

The concentration program followed in 1945 was essentially similar to the 1944 order.

PUGET SOUND SALMON INDUSTRY

In order to save manpower and equipment, the Puget Sound salmon canning industry was placed under a concentration order at the beginning of the 1944 season. The concentration was effected at the request of the industry, in order that wartime operations in the Puget Sound salmon fisheries might be conducted as advantageously as those in Alaska.

The number of plants canning salmon in Puget Sound in 1944 was reduced from the usual 11, to 3—fewer plants than had operated in any year since 1893. Under the concentration plan, the largest plant in the area packed salmon for 9 firms. It was estimated that a saving of more than 525 cannery workers and tender operators was accomplished. In addition, there were considerable savings in the use of Diesel oil and the maintenance of cannery equipment.

The industry was continued under a similar concentration plan in 1945. However, four instead of three plants were authorized to operate, to provide for the somewhat heavier runs of salmon expected in the Puget Sound area that season.

PACIFIC PILCHARD INDUSTRY

The pilchard production program, which was directly concerned with a billion pounds of fish or nearly a quarter of the annual fishery production in the United States, differed considerably from the salmon concentration plan in its purposes and methods.

Unlike salmon, pilchards or Pacific sardines have several major uses, being processed into oil and meal in addition to being canned. Although each of these uses is important, the production of canned

fish was considered most essential, the demand for this easily transported protein food for war purposes being greatly in excess of the supply. The production program for the pilchard fishery was therefore administered with a view, not only to increasing production, and conserving manpower and materials, but also to diverting the largest possible proportion of the catch to the canneries.

The first order issued by the Office of the Coordinator of Fisheries for the control of the production of pilchards became effective in the 1943-44 season. Under this order, all vessels engaged in pilchard fishing operated under permits issued by the Coordinator of Fisheries through his local representatives. The order applied to all vessels of 20 net tons or over, which had fished for pilchards at any time subsequent to May 31, 1940.

Although operating under the control of the Coordinator's Office because of the emergency, the industry remained under the general provisions of the State laws with respect to seasons and fishing areas. The Coordinator of Fisheries and his designated representatives were concerned largely with the distribution of fishing vessels among ports, with the delivery of the catch to canneries and reduction plants, and with determining how much of the yield should be canned and how much should be processed as meal and oil. Normally, about a quarter of the catch is canned as the familiar Pacific sardine and the balance is processed into meal and oil.

Generally speaking, there was gratifying cooperation on the part of the fishing fleets and shore plants in operating under the program. There was a stable and for the most part a well proportioned distribution of boats between ports and deliveries to the plants within the ports were in proportion to the quantities each plant could process. There were few instances where boats were delayed in unloading and these occurred only when huge catches were made on a number of successive days, clogging port receiving facilities.

During the second season in which a production program was followed, many of the difficulties met in its original operation were solved. As a result of this circumstance and of the generally more favorable conditions (additional boats, good weather early in the season, steady runs of fish) production during the 1944-45 season increased 15 percent over the previous year, and the pack of canned sardines increased 19 percent.

The quantity of canned sardines requisitioned by the Government was increased from year to year with the mounting needs for this protein food, in high demand because it is so easily transportable. During the 1943-44 season, the Government set-aside orders amounted to approximately half of the total pack. The following season the reservation for Government purchase was increased successively from 45 percent at the beginning of the season to 55 percent in the

early months of fishing, and finally to 100 percent of the pack at the season's end. The Government requisition announced at the beginning of the 1945-46 season was 80 percent of the pack.

ALLOCATION OF HALIBUT

An order providing for the allocation among dealers of all halibut landed at United States ports on the Pacific coast became effective June 23, 1944. Under the terms of the order all persons or firms were prohibited from purchasing halibut without a permit issued by the Office of the Coordinator of Fisheries. The principal purposes of the order were to distribute halibut as efficiently as possible to meet war and essential civilian needs, to provide the various markets with essentially normal portions of the product, to support the price-control program of the O. P. A., and to facilitate the maximum production of halibut with minimum expenditure of critical materials and manpower.

In 1944 landings of halibut were allocated among dealers in each port on the basis of the total landings at that port handled by each dealer in a previous period, selected as a base. In 1945 the order was modified to provide for allocation to each dealer in accordance with his share, during the base years, of the halibut business of the entire coast, without regard to where the fish were landed. This amendment was intended to improve distribution, and to protect dealers from the effects of shifts of landings from port to port. The amended order also provided for the conditioning of permits to insure more normal distribution to inland markets.

PRODUCTION RECORDS DURING THE WAR PERIOD

The yield of fishery products suffered a drastic reduction during the first year of war. The normal peacetime yield of the fisheries is about 4.4 billion pounds. In 1942, however, the catch declined to 3.9 billion pounds under the stress of war-created difficulties of operation. By the end of 1943, the programs of the Coordinator's Office were beginning to exert their effect and the catch rose to 4.2 billion pounds. In 1944 it actually exceeded the peacetime average, a production of 4.5 billion pounds being achieved. During the first 6 months of 1945, still further gains were recorded in the fisheries as a whole.

Considered by classes of fishery products, the yield, in comparison with the need, was uneven. At no time was there enough canned fish to supply all civilian needs after essential war requirements had been met. Nor was there enough fish meal and oil for animal feeds, or oils for industrial purposes. The domestic vitamin oil industry developed by mighty strides, supplying the fish liver oils that formerly were obtained largely by import, but by 1945 it was apparent that additional domestic sources of oil would have to be discovered if the

United States industry was to prove capable of meeting the heavy demand for vitamin-A oils. Only in the fresh fish field was the supply commensurate with the need, and even fresh fish became scarce in 1945, owing to the extreme shortage of meat and consequent heavy demand for fish. It should be remembered, however, that the actual wartime needs for fish were far in excess of any previous production in the history of the industry; that the production achieved by the industry in the last 2 years of the war would have been considered excellent by any previous standards.

Probably no other nation in the world was able to maintain its wartime production of fish so well. It is a matter of record that most of the European fisheries were shattered, their fleets destroyed, their shore facilities wrecked, their accustomed fishing waters sown with mines. Most Asiatic fisheries were affected in similar fashion. The wartime difficulties suffered by the fisheries of the United States differed in character and in degree from those of most of the belligerents, but the impediments to operation, especially in the early years of war, were none the less real. The wartime achievements of the fishing industry are a record of distinguished service, and a testimony to what may be accomplished by cooperation in a common cause between Government and industry.

National Park Service

NEWTON B. DRURY, *Director*



THE increase of travel to the national park system areas after VE-day gave an intimation of postwar responsibilities that face the Service. This report, then, is not solely one of progress or accomplishment; it is also an analysis of the status quo in search of a workable plan to meet the immediate needs of millions of war-weary Americans, while serving their future needs by according the fullest degree of protection to the heritage embodied in the National Park System.

SERVICE HAS BEEN HOLDING THE LINE

This has all been recognized by Chairman Jed Johnson, of the Interior Department Subcommittee of the House of Representatives' Appropriations Committee. In discussing reductions in the 1946 estimates of funds for the national park system, he said: "America's entry into the war affected the National Park Service far more than any other agency within the entire Department * * *. The Service is to be commended for the spirit with which it has carried on under extremely adverse circumstances." The circumstances may be illustrated most effectively, perhaps, by the following tabulation comparing allotments provided and services rendered during the last prewar year (1941) with those of the war years:

	As of June 30—				
	1941	1942	1943	1944	1945
Employees.....	5, 145	4, 510	1, 974	1, 573	1, 577
Visitors.....	19, 306, 959	16, 034, 285	8, 228, 220	7, 460, 185	8, 546, 316
Appropriations.....	\$9, 370, 030	\$14, 609, 775	\$5, 347, 365	\$4, 563, 560	\$4, 740, 810

Examples of the difficulties of wartime operation are many. A few might here be given. In Glacier National Park, where the forest fire danger is high, there are 1,085 miles of fire-fighting and tourist trails which have to be opened not once, but several times yearly. Only by means of camps of conscientious objectors assigned by the War

Department was it possible to maintain these trails in usable condition. In Hawaii National Park, with extremely heavy visitation of armed forces personnel, the greatly reduced staff was inadequate even to maintain trails and comfort stations or provide police and fire protection.

In September, the most severe hurricane in 40 years whipped the Atlantic coast, seriously damaging several Service areas. At Fort Raleigh National Historic Site, as an example, between 70 and 80 trees were blown down and the palisade fence surrounding 16 acres was flattened. Only through \$1,195 of emergency reconstruction and fighting forest fires funds was it possible to accomplish such repairs as could be made. At Petrified Forest National Monument, 120 men in maintenance made it necessary to utilize protective personnel badly needed to prevent vandalism and theft of petrified wood and emergency maintenance of the power plant, water system, and other facilities. These situations are typical of the entire national park system, but the ingenuity and cooperation of our employees enable us to keep the numerous units of the System in operation and open to visitors, many of them in the service of the United Nations.

Passage of the peak in the program of organizing the Nation's resources for war and the progress of the war toward its victorious close resulted in a sharp decline in applications for military and other wartime uses of Service-administered areas during the past year. Only 455 new special use permits were granted, 228 previously issued permits were continued, and 602 were terminated. In all, 2,396 new use permits have been issued for national park areas.

Although the work of the National Park Service was not considered to be tied in directly with the prosecution of the war, the areas administered provided much-sought recreational opportunities for members of the armed forces and those engaged in war industry and it is also fair to say that the system through war permits made an appropriate contribution to the victory. The use of park lands for military purposes made unnecessary the purchase of other lands and that there was an estimated saving of approximately \$30,000,000 from the funds of the Army, the Navy, and other war agencies that otherwise would have been expended for land. Yet there was little destruction of park properties through these emergency uses. Under the war permits, as a matter of critical war necessity, tungsten was obtained from an isolated section of Yosemite National Park, in accordance with the previously announced attitude toward such purposes. The national parks, it is believed, are not the places in which to experiment with new developments in transportation. Aside from the fact that safe locations for landing strips are few in the national western parks, it is doubtful if such facilities within the parks would provide material advantages over those which might be established elsewhere.

short distances beyond their borders. Railheads are generally outside the parks. The same should be true of airports.

Two pending legislative proposals, in addition to those directed at Jackson Hole National Monument and the Antiquities Act, would or could affect certain Service-administered areas adversely. The bills providing for the establishment of a Missouri Valley Authority (S. 555 and H. R. 2203) contain no provision exempting Yellowstone, Glacier and other units of the national park system situated in the Missouri Basin from the construction of water-control structures within them or that would impound waters inside their boundaries. A threat to the historical atmosphere and the Colonial character of Colonial National Historical Park is found in the Bland bill (H. R. 26) which would authorize the construction of a lofty suspension bridge across the York River at Yorktown, of which the elevated southern approach would be constructed on park lands. The Secretary of the Interior and the Service have endeavored to meet this threat by pointing out the advantages of other locations for the proposed bridge.

Those who appreciate the charm of the old Chesapeake & Ohio Canal, now a part of the National Capital Park system, and the scenic values of the Potomac Valley, including the Great Falls, a short distance above Washington, were heartened by the strong protests registered against the Corps of Engineers' proposal to construct a series of flood-control power dams along the course of the Potomac, and the consequent decision against this proposal.

TRAVEL TO NATIONAL PARK AREAS INCREASING

The fact that, despite tightened rationing of gasoline and a Nation-wide campaign to reduce civilian use of common carriers to make room for war transport, the number of visitors to units of the national park system increased from 7,460,185 during the year ending June 30, 1944, to 8,546,316 for the year ending June 30, 1945, indicates the pressure for services and accommodations under which the greatly reduced staffs of the National Park Service and of the concessionaires had to operate. Many of the visitors were war industry workers and their families moving to other jobs, and uniformed personnel of the armed forces traveling between stations or coming in groups to the parks and monuments for rest, recreation, or recuperation.

Throughout the year, the policy of refraining from all activities which would tend to promote travel was continued. No effort will be devoted to that end in the near future. It need not be. After the war many areas in the System will have many more visitors than can be accommodated satisfactorily with existing facilities. Effort needs to be directed rather toward effecting a more even distribution of travel, so that peaks may be at least partly leveled off, and more

visitors may derive greater enjoyment from their visits than can be obtained during the crowded periods.

A statistical tabulation of areas and the volume of travel to each appears on pages 228 to 231 inclusive.

CONCESSIONAIRES FACE WARTIME DIFFICULTIES

Concessionaires continued to operate on a limited scale throughout the year. In areas near war activity centers they encountered great difficulty in meeting demands because of manpower and food supply shortages. As required by their contracts, concessionaires furnished limited services such as stores, meal and sleeping accommodations, and other requirements, in areas where distinct need was manifest. All OPA rules and regulations with respect to ceilings and food and gasoline rationing were applied in national parks as elsewhere. The Service worked with the concessionaires in meeting problems caused by drastic fluctuations in the volume of service. In two specific cases, with approval of the Comptroller General, concessionaires were authorized to terminate or temporarily suspend services called for by their contracts.

The Western Conference of National Park Concessionaires met in Los Angeles on April 24-25, with the Director and a few officials of the Service in attendance, for discussion of such subjects as employee wages and hours, sale of souvenirs, public health, postwar travel trends, and postwar planning of accommodations.

National Park Concessions, Inc., a nonprofit distributing corporation, continued to furnish facilities at Mammoth Cave, Isle Royale, and Olympic National Parks. It did not operate on the Blue Ridge Parkway nor in Vanderbilt Mansion National Historic Site because of war conditions, but will start operations at these places and in Big Bend National Park whenever postwar relaxations permit the construction of needed accommodations.

LIMITED ADVANCE PLANNING ACCOMPLISHED

The "closed for-the-duration" status of development and construction continued, and planning activities have dealt primarily with preparation for transition from wartime restrictions to normal postwar activities. This standstill in development provided an opportunity to appraise past efforts and to make definite plans for the future. Studies were undertaken to establish a basis for future policies regarding all-year use at areas such as Crater Lake, Mount Rainier, and others where developments cannot be planned until a definite use policy is established.

Special Problems

Consideration was given to the type, extent, and location, or relocation, of concession operations at Sequoia-Kings Canyon, Yosemite, Big Bend, Isle Royale, and Olympic National Parks. The location and extent of headquarters developments at Great Smoky Mountains, Antietam, Petersburg, and Gettysburg were also studied.

Advance Planning

Although master plan work was in general limited to minor revisions, preliminary plans were made ready for Big Bend, Grand Teton, and the Jamestown Island section of Colonial National Historical Park. A new master plan was prepared for Carlsbad Caverns National Park and the first complete plan for Natchez Trace Parkway was submitted. Although lack of funds prevented planning of specific postwar development projects, a number of steps were taken in preparation for this program. Two postwar project programs were tabulated, with expense and time estimates, as part of the over-all Department of the Interior program. In an effort to establish a priority on future work for survey or construction, priority lists of important road, trail, physical improvement and parkway projects were prepared.

Late in the year, a landscape architect was established at Juneau, Alaska, to begin the basic field study and planning which must precede any developments on the five units of the National Park system in Alaska. Architects assigned to the Blue Ridge and Natchez Trace Parkway offices collaborated with the Public Roads Administration in the production of contract plans for bridges and grade separation structures.

PROTECTION CONTINUED UNDER HANDICAPS

Fire Prevention and Suppression

As the virgin forests of the Nation are cut or otherwise modified by commercial uses, the remnants preserved within the National Park system increase in importance to the Nation. Fire is always the great threat to those forests. Despite shortages of manpower and equipment, it is reported with considerable satisfaction that only 276 forest fires occurred in areas of the National Park system during the calendar year 1944, the smallest number during any year of the past decade. A total of 4,928 acres was burned over, of which 973 acres were forest, 607 acres brush, and 3,349 acres grassland. Intensive fire control training activities were continued by means of regional conferences. Deterioration of specialized and mechanized control equipment, impossible to replace during the war, and the necessity of using inex-

perienced youths and older men in fire control added to the normal problems of this protective work.

Combating Forest Insect Pests

Because of wartime relaxation of insect control measures, widespread epidemics developed in certain sections of the West and directly affected some of the park areas. It has been possible to handle incipient epidemics in some areas, but serious losses are faced in other sections because of inadequate funds to attempt complete control. Among forest insects combated were the spruce budworm in Rocky Mountain, bark beetles at Scotts Bluff and Bryce Canyon, Engelmann spruce beetle at Cedar Breaks, and saw flies, "loopers," leaf miners, and tent caterpillars at Zion.

Combating Tree Diseases

White pine blister rust continued to spread southward both in the East and in the West. Control work consisting of destruction of the alternate host (currant and gooseberry bushes) during calendar year 1944 included eradication on 1,603 acres and re-eradication on 8,533 acres, the maximum possible under manpower shortages. It is imperative that initial control be intensified, particularly in California, if the magnificent sugar pines of Yosemite and Sequoia-Kings Canyon are to be protected before the disease reaches those areas. The beech bark disease has invaded Acadia National Park but is being fought successfully by sprays which control scale insects whose attack precedes infection. Continuing control is essential.

Studies on the cactus necrosis, which became epidemic in Saguaro National Monument, indicate that the disease is fatal to old, mature plants, that its progress can be slowed by treatment, but that the principal threat to the continuation of the cactus forest is the lack of reproduction, due to overgrazing.

Soil and Moisture Conservation

Accelerated erosion on arid lands, often aggravated by overgrazing, has been controlled to some extent by measures financed through Departmental Soil and Moisture funds. Major prehistoric ruins in Canyon de Chelly and Chaco Canyon National Monuments have been saved from destruction by diverting or dispersing flood waters which have cut channels threatening to undermine these ancient pueblos. Nine units of the system benefited by soil and moisture work, including the new Big Bend National Park.

Impact of Visitor Use

Human use, which beyond a certain point inevitably results in wear and tear, during the war relaxed to some extent with the marked

reduction in travel. Studies were made at Zion National Park in an effort to determine harmful effects of past use and provide future controls. Carelessness and vandalism continued, especially at the Petrified Forest and in the various limestone caverns, where the temptation to take souvenirs seems well nigh irresistible to some. At Carlsbad Caverns National Park, an experiment in prevention of vandalism through education was tried with some success on the theory that when people understand the vast length of time and the intricate processes required by nature to create irreplaceable formations they will think twice before wilfully destroying them.

Protection of Prehistoric Ruins

Throughout the Southwest prehistoric Indian ruins are subject to the destructive effects of weather and, to some extent, rodents and livestock. During wartime, almost no funds were appropriated for protective work, and accelerated deterioration resulted. Unless a determined and well-financed effort is made to preserve what remains, the life of many of these structures is definitely limited.

Grazing Eliminated in Big Bend

Although transportation and manpower difficulties impeded the removal of stock from lands within Big Bend National Park and in a few cases extensions were provided, over 90 percent of all stock had been removed at the year's end. In some portions of the area, improvement in vegetation is already noticeable.

WILDLIFE MANAGEMENT

The majority of wildlife problems in national parks and monuments arise from factors over which the National Park Service has little or no control, either because areas are too small or because their boundaries are such that they provide incomplete biotic units. They are therefore affected materially by such outside influences as predator eradication, competition with domestic livestock for food during winter periods when game and other animals migrate beyond the boundaries, and hunting; these, in turn, result in the building up of surpluses of certain species, and overconcentrations in certain locations. The end result is adverse effect upon both wildlife and vegetation, including the forests.

Such situations make it difficult to develop management programs that will assure reasonably stable wildlife populations. They require constant study and the development of management practices based upon it. Overpopulations of game animals in several parks have stimulated group pressure to open them to public hunting as a means of harvesting the surplus. Aside from the fact that it is prohibited

by law, the National Park Service is convinced that any authorization of hunting would establish a dangerous precedent, as well as have other detrimental effects. Where control has been necessary, the Service has continued to exercise it. Reductions were carried out at Rocky Mountain National Park, where 301 elk and 113 deer were removed, and at Zion National Park where 112 deer were killed. Normal hunting outside of the boundaries of Yellowstone National Park kept the elk herd there at a safe level, so that no reduction was necessary.

The past year saw progress in the Service's program of eliminating feeding and other artificial controls over the bison of Yellowstone and reestablishing these animals in their native state—a program based on the long-established policy of displaying the wildlife of national parks under conditions as nearly natural as possible. Careful attention will continue to be given to the herd so that any detrimental developments or influences may be recognized and steps taken promptly to correct them.

The ban on the feeding of garbage to the bears of Yellowstone and Yosemite has been maintained, and though there has been some criticism of it by those who consider "bear shows" in national parks an attraction to many visitors, the Service feels that it is entitled to ample time to test the practicability of the revised practices as an improvement for both the visitors and the bears. No doubt the "shows" have been an attraction to many. However, they have produced wholly unnatural concentrations of both black bears and grizzlies, have tended to make them dependent on man and unwilling to shift for themselves, and have displayed these animals under artificial conditions. The principal problem still faced by the Service in connection with these animals is the insistence of some visitors on giving them "handouts," a dangerous practice the prohibition of which is difficult to enforce.

Because of the continuing problem of bighorn sheep-wolf relationships at Mount McKinley, arrangements have been made with the Fish and Wildlife Service for a study to determine what action, if any, is required. Observations at Joshua Tree National Monument indicate that both deer and desert bighorn sheep increased there during the year. The reestablishment of wild turkeys at Mesa Verde National Park appears to have been successful. The use of park waters by fishermen brought up numerous questions of fish management, but the establishment of effective controls are dependent on securing factual data. The Fish and Wildlife Service completed studies in Big Bend National Park as a basis for setting up fishing rules and regulations there. In Glacier National Park, a Fish and Wildlife Service aquatic biologist carried on extensive stream survey work leading to obtaining evidence as to migration and reproduction

habits. The study is designed also to provide an evaluation and comparison of various stocking practices. Fish management studies were also initiated in a few parks by National Park Service personnel.

COOPERATIVE RESPONSIBILITIES GROW

Completion of the Alaska Highway Study, undertaken with funds supplied by the Army, was followed by a request from the Corps of Engineers, under section 4 of the 1944 Flood Control Act, for an appraisal of the recreational resources of 68 reservoir sites under consideration by the War Department, and these studies are being undertaken. Cooperation with the Bureau of Reclamation in studies of reservoir basins which they plan to develop or have developed continued in increased volume. This involves a series relating to Missouri Valley reservoir projects likely to extend over several years. The Service also conducted investigations of the recreational potentialities of 100 sites under consideration on seven river basins in Texas, Oklahoma, and portions of Kansas, Colorado, and New Mexico. Planning studies continued, in cooperation with the Bureau, on the Columbia Basin project, while the survey of the recreational resources of the Colorado River Basin, under way for several years, made material progress.

Administration of the recreational activities at Shasta Dam and Friant Dam in California, in addition to planning and development, comparable to that which the Service has furnished for some years at Boulder Dam, was provided for in an agreement with the Bureau of Reclamation, and a start was made on the establishment of the needed planning and administrative organization. A similar responsibility has been placed on the Service with reference to Lake Texoma, in Texas and Oklahoma. Though the acquisition of additional lands to insure proper development was recommended, no steps have been taken in this direction.

HISTORIC SITES ACT TEN YEARS OLD

During the 10 years since President Roosevelt approved the Historic Sites Act, 560 historic sites have been inventoried and 334 archeological sites have been cataloged. Sixteen of the sites recommended by the Advisory Board on National Parks, Historic Sites, Buildings and Monuments have been approved by the Secretary and created national historic sites. Each of these fills an important place in the Federal program of presenting a well-balanced pageant of American history. The studies have accumulated a large body of basic data useful to the Secretary and to Congress in considering establishment of new areas and in formulating policies for preservation and restoration. They emphasize the richness of the Nation's historical and archeological

resources. It is hoped that the historic sites survey, now a little more than half finished, can be completed in the early postwar period.

The first meeting of the entire Advisory Board on National Parks, Historic Sites, Buildings and Monuments since May 1942, was held in Chicago on December 7-9, 1944. On March 8-9, 1945, a meeting of the interim committee of the Board was held in Washington, D. C. Tom Wallace of the Louisville Times was appointed to fill the vacancy on the Board created by the death of Richard Lieber. On June 14, 1945, the Board suffered the loss by death of its chairman, Edmund H. Abrahams, who had served on the Board since its inception and whose wide knowledge of national park problems had been a great aid to the Service. To aid in the investigation, selection, treatment, and interpretation of historical and archeological areas, the American Council of Learned Societies defrayed the expenses of a conference in Morristown, N. J., June 7-8, 1945.

Successful prosecution of the war was reflected by increased public interest in certain types of historical reservations, particularly memorials, associated in the public mind with the ideals of liberty and democracy for which this Nation stands. The Statue of Liberty National Monument, which participated with its lights in the VE-day observance, was the scene of a great Fifth War Loan drive rally on June 2, 1945. An illustration of the colossal stone portraits of former presidents constituting the Mount Rushmore National Memorial was widely distributed as a Seventh War Loan drive poster.

The huge cyclorama, a painting 400 feet long by 50 feet high, portraying Pickett's charge in the Battle of Gettysburg and located in Gettysburg, Pa., was designated a national historic object by the Secretary on October 5, 1944. Painted by Paul Philippoteaux in 1882 at a cost of \$100,000, it is considered an accurate portrayal of Pickett's action. Among other important historical acquisitions during the year was the Historic Boundary Oak, perhaps the only living object on Abraham Lincoln National Historical Park dating back to the time of Lincoln's birth.

VARIETY OF LAND PROBLEMS FACE SERVICE

Non-Federal Lands in Service Areas

During 1945, as in the past, many problems of development planning, protection, and administration defied solution because of lack of land control. Within the boundaries of units of the National Park System there are more than 600,000 acres of non-Federal land. During the year considerable progress was made in obtaining detailed information as to the location, importance, and physical characteristics of these lands. One of the greatest needs of the National Park System is an

orderly program of land acquisition, based on reasonable recurring appropriations, and directed toward the ultimate elimination of non-Federal land ownership within authorized boundaries of all park areas. Until such a program can be established, scenic values will continue to be lost, undesirable developments and uses will persist, and difficulties in planning and providing for needed developments will continue to plague the Service.

The serious situation existing in Joshua Tree National Monument, where thousands of acres of railroad lands checkerboard a large part of the area, well illustrates this problem. The possibility of a promotional land-selling project threatens the future of this monument.

In Glacier National Park, the Izaak Walton League of America, Inc., made an emergency purchase of 10 lots near Lake McDonald to be held until such time as the Service is able to buy them from the league. The league set up a land purchase revolving fund to be used in similar emergencies to buy non-Federal lands.

As a basis for rounding out ownership or eliminating lands whose retention is not justified, the Service has made a small beginning on the review of boundaries of each area under its administration. Studies were made of boundary problems at Zion National Park and Monument, Grand Canyon National Park and Monument, and Wupatki National Monument. Similar studies were made for the Bureau of Reclamation at Boulder Dam National Recreational Area.

New Areas and Additions to Existing Areas

Actual land changes in the National Park system were few. Investigations of proposed new areas ceased during the war, and acquisitions were confined to acceptance of donations under authority of Congress or to minor boundary rectifications. At the close of the fiscal year, the system contained 168 units, one new unit having been established and two eliminated since June 30, 1944.

After some 8 years of endeavor, the Richmond National Battlefield Park, Va., notable as the scene of several bitter battles during the Union drives on the Confederate Capitol, was established on July 14, 1944, when the Department accepted title to 688.44 acres from the Virginia Conservation Commission. Added to Shiloh National Military Park, Tenn., was a small but important tract of 0.93 acre donated by Mr. and Mrs. W. A. Shaw, and accepted by the Secretary on March 12, 1945. All titles having been cleared, the 80-acre Adams estate was added to Lava Beds National Monument, Calif., through acceptance of deeds by the Secretary in November 1944. On July 28, 1944, the Secretary accepted approximately 32 acres of land in Hot Springs National Park, on which the United States Public Health Service operates a Medical Center. Thurston Lava Tube lands totaling 20.6 acres in Hawaii National Park were accepted by the

Department on April 11, 1945. At Mount Rainier National Park, a contract to purchase 304.84 acres of Northern Pacific Railway timberlands, adjacent to the Nisqually entrance road, which the Service has been attempting to obtain for 19 years, was approved.

Reductions

Custody of the Chattanooga National Cemetery, Tenn., was transferred back to the War Department on March 1, 1945. Camp Blount Tablets National Memorial, Tenn., although listed under the 1933 Presidential Reorganization Order, was found to have no legal status as Federal property.

Projects and Prospects

Because of oil exploration activity on the North Carolina "Banks," North Carolina State authorities have had to delay the acquisition of lands essential to the Cape Hatteras National Seashore Recreational Area project, authorized by act of Congress August 17, 1937. Progress on the 10,000-acre Cumberland Gap National Historical Park project, with lands in Kentucky, Tennessee, and Virginia, has been encouraging. Four thousand acres of the 5,100 in Kentucky have been acquired by the State, and Tennessee has completed surveys on approximately 2,600 acres for proposed acquisition.

By congressional act approved December 6, 1944, provision was made for acceptance by the Federal Government of lands and waters within the Everglades National Park project, Florida, for wildlife protection only, pending establishment of the authorized national park. Title papers relating to the first conveyance by the State of Florida of more than one million acres of the project are in the hands of the Fish and Wildlife Service, which will protect the extraordinary bird life and other biological features of the area.

The Fort Frederica National Monument Association, Georgia, had acquired nearly all of the land involved in this project by the end of June. The entire area has since been accepted and the monument established.

The Grandfather Mountain Association, a non-Federal body in North Carolina established for the purpose of acquiring lands for this proposed addition to the Blue Ridge Parkway, has obtained price quotations and tentative agreements from the landowners. Congress having authorized the establishment of a national monument of not more than 1,500 acres at Harpers Ferry, W. Va., the prospective area was carefully studied and recommendations as to the lands to be included were presented to the Secretary.

The State of Iowa has acquired approximately 1,000 acres necessary for the Iowa Indian Effigy National Monument project. Conveyance of the land to the Federal Government and establishment of the na-

tional monument is anticipated in the near future. Efforts continued to complete the land and development programs of the Manuelito National Monument project in Arizona and New Mexico. The Queets Corridor and Ocean Strip, Olympic National Park, a Public Works project embracing the scenic and picturesque coastal area of northwestern Washington, remained in the acquisition stage.

By his first action in direct connection with a project of the National Park System, President Truman approved the Touro Synagogue National Historic Site project, Rhode Island, on April 19, 1945.

To be administered by the Service as a national historic site, the Adams Mansion project, Quincy, Mass., was near fulfillment at the year's end. This house, the home of generations of this famous family, possesses exceptional historic value.

Legislation authorizing the establishment of Patrick Henry National Monument at Red Hill in Virginia was repealed by act of December 21, 1944. The State of Virginia has undertaken a similar project.

Water Rights in the Western States

The Service has completed 10 years of concentrated effort to establish rights to use water in its various areas, started in February 1935 with Civilian Conservation Corps funds, and is now in an excellent position to keep the work abreast of new construction and water use when the public resumes peacetime recreational travel.

Recreational Demonstration Area Transfers

Fall Creek Falls and Shelby Forest recreational demonstration areas, totaling 28,035 acres, were transferred to Tennessee for State park purposes, in accordance with the terms of the act of June 6, 1942, and 1,072 acres of the Otter Creek area in Kentucky went to the War Department as an addition to Fort Knox. The transfer of the 66,376-acre Roosevelt area in North Dakota to the Fish and Wildlife Service for establishment as an upland game refuge has been approved by the President but had not been completed at the year's end. Fourteen additional areas, totaling 81,251 acres, in California, Georgia, Kentucky, Missouri, Oregon, Pennsylvania, and Virginia are available for transfer to the States.

EMPLOYMENT CRISIS ENDED

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The Fort Frederica National Monument Association, Georgia, had acquired nearly all of the land involved in this project by the end of June. The entire area has since been accepted and the monument established.

The Grandfather Mountain Association, a non-Federal body in North Carolina established for the purpose of acquiring lands for this proposed addition to the Blue Ridge Parkway, has obtained price quotations and tentative agreements from the landowners. Congress having authorized the establishment of a national monument of not more than 1,500 acres at Harpers Ferry, W. Va., the prospective area was carefully studied and recommendations as to the lands to be included were presented to the Secretary.

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The Service has completed 10 years of concentrated effort to establish rights to use water in its various areas, started in February 1935 with Civilian Conservation Corps funds, and is now in an excellent position to keep the work abreast of new construction and water use when the public resumes peacetime recreational travel.

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The rate of losses to the armed services diminished during the year, mainly because few physically fit men of military age remained. However, in accordance with the announced policy of the Selective Service System not to induct men beyond an age desirable for military service who are engaged in essential occupations, a few deferments were requested and approved.

While vacancies during the year averaged approximately 10 percent of permanent positions, the crisis in employment has passed. By June 30, 1945, 33 veterans had returned to their former positions in the organization. This number is small compared to the total number of employees on military furlough, but it is indicative of the trend. More and more veterans are becoming available for original appointment.

Many men now in the armed forces have expressed interest in the National Park Service as a postwar career. Some of this interest has been aroused as the result of visits to units of the system as part of a military training program, en route between assignments, or attendance at a rest camp. Names of these inquirers have been recorded so that they may receive announcements of suitable examinations, and they have all been encouraged to renew their applications immediately upon discharge.

Service requirements offer a great variety of opportunities for the employment of special talents and interests in the field of conservation. The maintenance of high standards of performance rests upon placing each employee in the position for which his interests and ability best qualify him. To determine and record these interests and qualifications and at the same time to train new employees in the details and requirements of the positions which they will fill on entering the Service necessitates the establishment of a program of in-service training. For many years the Branch of Forestry has maintained such a project in training new and old employees in the latest fire-fighting practices and use of equipment. Several colleges and universities have expressed interest in establishing courses leading toward preparation of students for careers in national park administration, an interest which the Service has encouraged through suggestions for use in setting up a curriculum.

Important Personnel Actions

Charles L. Gable, Supervisor of Concessions, retired because of disability, and Oliver G. Taylor, formerly Chief of Engineering, was placed in this position. Arthur W. Burney, Assistant Chief of Engineering, was advanced to Chief of Engineering.

The vacancy in the position of Superintendent of Acadia National Park, Maine, resulting from the death of George B. Dorr, was filled by the advancement of Assistant Superintendent Benjamin L. Hadley.

Blair Ross was advanced from superintendent, Shiloh National Military Park, to fill the position of superintendent of Great Smoky Mountains National Park vacated by the retirement of Ross Eakin because of illness and disability. James W. Holland, custodian of Andrew Johnson National Monument, was placed in charge at Shiloh. Chief Ranger Wallace Stephens of Shenandoah National Park was advanced to the custodianship of Andrew Johnson National Monument. Dr. A. R. Kelly, custodian at Salem Maritime National Historic Site, and William W. Lockett, custodian at Ocmulgee National Monument, exchanged positions.

Col. David C. Chapman, former chairman, Tennessee Great Smoky Mountains National Park Commission, who took an important part in the establishment of the park, died on July 26, 1944.

LEGISLATION AFFECTING ANTIQUITIES ACT

Five bills designed to modify or abolish the Antiquities Act of June 8, 1906, are pending in the Seventy-ninth Congress. House bill 409, introduced by Representative Fernandez, would amend section 2 of the act to require congressional concurrence in the establishment of national monuments of more than 10,000 acres; House bill 1507 was introduced by Representative Chenoweth and House bill 2110 by Representative Barrett to repeal section 2 of the act and thus take away the President's authority to proclaim national monuments on Federal lands; Senator Robertson's Senate bill 664 would require approval by the governors and a majority of the congressional delegations of the States effected before the issuance of national monument proclamations pursuant to the act; House bill 1112 was introduced by the late Representative O'Connor to repeal the Antiquities Act. Reports were prepared on all of these bills, but congressional action has not been taken on any of them.

JACKSON HOLE NATIONAL MONUMENT

The past year was marked by two important events in the controversy over the establishment of Jackson Hole National Monument on March 15, 1943. Last February, the validity of the monument's establishment was upheld in Federal District Court in the suit, *State of Wyoming v. Paul R. Franke*. A bill to abolish the monument (H. R. 2241), introduced by Mr. Barrett of Wyoming, was passed by both houses of Congress, but was vetoed by President Roosevelt who, on December 29, 1944, issued a memorandum outlining the reasons for his conviction that status as a national monument provides for use of this land in a manner best serving the national interest.

In the Seventy-ninth Congress, Representative Barrett has introduced House bill 2109 to abolish Jackson Hole National Monument and House bill 2691 to transfer the public lands in the monument to

the United States Forest Service for administration as national forest lands. Senate bill 664, by Senator Robertson of Wyoming, amending the Antiquities Act, is so framed that, if it became a law, the monument would be abolished. Representative Peterson of Florida has introduced House bill 1292, which provides for payments in lieu of taxes to the county where the monument is located, and for the continuance of grazing and other permits within the monument, in accordance with assurances already given by the Secretary of the Interior.

No funds were provided by the Congress for administration of the Jackson Hole area as a monument, but limited protection activities were authorized. Permits for grazing on public lands within the area, based on use during 1942, were authorized as a departmental measure. During the controversy, considerable space was devoted by the press to its discussion, much of it based on misunderstanding or misinformation. During the past year, however, and particularly after President Roosevelt issued his veto message, there has been increasing editorial comment strongly supporting his action. As an example, the editor of the Blackfoot, Idaho, Bulletin suggested that other editors and officials of interested organizations reexamine the evidence which, in the light of careful study, has caused him to withdraw his opposition and favor establishment and development of the monument. During the controversy, the national monument has received strong support from numerous conservation organizations.

INFORMATIONAL AND INTERPRETIVE SERVICES

Guide and Lecture Service

Naturalist and historian staffs remained at an absolute wartime minimum throughout the year; in fact the demand for interpretive services by visiting personnel of the armed forces together with the requirements of protecting collections and perishable park features, serving as consultants on technical problems, and maintaining libraries, exhibits, and other interpretive facilities kept the greatly depleted interpretive staffs and many of the custodians of smaller areas under excessive pressure. However, special efforts were made to afford guide and lecture service to members of the armed forces in the several areas where military visitors were especially numerous.

At Carlsbad Caverns National Park, the interpretive program was expanded by the development of a self-guiding nature trail and the establishment of a naturalist-conducted caverns trip. In addition, the procedure of handling visitors on trips through the caverns was radically revised, providing for the conduct of smaller groups and reducing the long waits which many visitors previously had to undergo.

Museums

While all museums in the system remained open insofar as reduced visitation and operating staffs permitted, no expansion of exhibits or other interpretive devices and activities was undertaken. Some planning was undertaken in the listing of urgently needed museum developments and the setting up of priorities for these developments on the project construction program.

Investigations

Accurate interpretation, adequate protection of natural values, and wise administrative practices require a considerable volume of research and investigation. Although many research projects with definite objectives can be and have been accomplished through the cooperation of other specialized Federal agencies, universities, scientific institutions, and research organizations, there remain projects necessitating continued observations over long periods of time or having other special requirements which only members of the resident park interpretive staff are in a position to accomplish. Recognition of this fact and the need for this type of research justifies postwar expansion of qualified interpretive staffs with adequate laboratory space and equipment.

Publications

Two publications issued by the National Park Service were particularly timely because of the greatly increased public interest aroused by the war in historical matters dealing with the establishment of this Nation as a land of universal liberty and justice. These publications are entitled, "The Oldest Legislative Assembly in America and Its First State House," and "'James Towne' in the Words of Contemporaries." "The Wolves of Mount McKinley," by Adolph Murie, of the Fish and Wildlife Service, recorded a noteworthy study of animal relationships.

Informational Services

With the approach of the climax in the prosecution of the war, increasing interest in the National Park system was indicated by a growing volume of inquiries regarding the areas under our jurisdiction and the purposes, policies, and administrative practices of the Service. School children sought information on historical areas because the issues involved in the war stimulated their interest in and appreciation of the accomplishments of the men who founded our Nation. A growing restlessness and desire to throw off the fetters of wartime travel restrictions made itself felt through a flood of inquiries from persons planning postwar vacations. Many such requests for information on units of the system came from men in the armed forces

whose realization of what these areas hold had been developed by visits to some of the units while in training or while transferring from one assignment to another. Editors, writers, and publishers, anticipating the timeliness of travel articles and books, requested detailed data, photographs, including color transparencies, and checking services in the preparation of numerous manuscripts. Automobile clubs and travel promotion organizations desired quantities of informational literature, not only as a source of information for their files but to distribute in response to the anticipated heavy demand. Departments of foreign governments embarking upon park and conservation ventures and made aware of the National Park System of the United States through contacts established in wartime enterprises, asked for assistance, counsel and details relative to selection and administration of units of the system. Although greatly handicapped by a reduced staff, the Service was able to furnish much of the information desired.

Informational Literature

As a means of aiding the small staff in answering requests for information quickly and inexpensively, a series of location maps, each one showing and describing briefly all units of the system in the area covered, was issued. A few of the informational circulars carrying condensed information essential to intelligent use of the areas were revised, and a limited number of new circulars prepared for unsupplied areas having wartime visitation.

There is need of much more extensive distribution of informational material to public libraries, schools, and newspapers and other publications, so that those who want facts or who wish to present facts can obtain them readily.

THE SERVICE LOOKS TOWARD THE FUTURE

To the question, "What does the National Park Service intend to do now that the war is over?", the answer must be, "We hope to do what we were doing before the war, but to do it better." This presupposes greater capacity, attained partly through wartime experience but principally through augmented funds and personnel. It presupposes also continued, if not increased, public recognition of the importance of the work.

The first problem to be met is that of getting the machinery of full operation into running order, involving a comprehensive program of rehabilitation for the roads, structures, and facilities which have suffered from lack of adequate maintenance during a crisis in which the prosecution of the war took precedence over all other activities. The barest minimum was asked for by the Service to continue essential activities. The field and central office staffs need to be restored

to peacetime size as rapidly as possible. Unless enlarged appropriations for the present fiscal year are obtained and rapid rehabilitation is effected, the coming heavy increase in travel will introduce or accentuate serious problems of providing service to visitors and protection to the parks.

It is estimated that an expenditure of approximately \$1,200,000 during the next 3 years will be needed to put the park areas into condition for postwar use. A program of such work has been formulated with great care and can be launched at full scale as soon as funds are made available.

Augmented field employment is required to perform the normal services which the public has a right to expect when it visits areas administered by the Service. Protective and administrative forces must be strengthened. Since the visitors desire both to see and to be informed about what they see, it is especially necessary that adequate staffs of naturalists or historians be placed on duty before the upsurge of 1946 vacation travel, so that there may be sufficient preparation for the conduct of their work.

Development

Solutions to certain present and anticipated problems depend not only upon sufficient personnel and funds, but upon adequate physical developments, upon which progress has been at a standstill for nearly 5 years. Over-all development, provided for in master plans which were prepared before the war, and which have been kept reasonably up to date during the intervening years, calls for a great variety of undertakings. It must include certain roads and trails, limited, in accordance with Service and departmental policy, in number and extent to those required to meet legitimate public and administrative needs. It involves public service facilities affording transportation, food, and lodging; essential administrative, protective, and maintenance structures such as offices, shops, museums, storage structures, fire detection towers, employee residences and fences, all carefully designed, located, and landscaped for effective use with a minimum of intrusion into either natural or historic scenes. Good planning for these types of development takes time and thought and it must precede development if irreparable mistakes are to be averted. It cannot be done in a hurry. It is also contingent upon control of land—which points to the necessity of an orderly program for acquisition of private and other non-Federal lands now situated inside the boundaries of Service-administered areas.

Implications of Enlarged Responsibilities

The responsibilities of the National Park Service are increasing both in volume and in diversity. The transfer of national military

areas and a number of national monuments to National Park Service administration in 1933; and the passage of the Historic Sites Act in 1936, with the resultant establishment of a group of national historic sites greatly enlarged the scope of the Service beyond what it was when established in 1916; the Park, Parkway and Recreational Area Study Act of 1936; the conduct of cooperative recreational studies for the Bureau of Reclamation and the Corps of Engineers; and, within the past year, the placing on the Service of responsibility for the administration of recreational facilities at Lake Texoma, in Texas and Oklahoma, and at Shasta and Friant Dams in California, have all meant expanded activities and more complicated organization.

The National Park Service is performing these new functions to the best of its ability. Yet there remains a primary responsibility for the integrity of the National Park System, and the Service is determined that no spreading of effort shall detract from the performance of its original duties. The National Park System is an entity which has distinct meaning to millions of Americans. It is important that its identity be maintained; that the basic distinctions in purpose and policy between the system and those other areas which are not a part of it be clearly established and made plain to the public. The work of the Service is being organized with this in view.

OTHER NATIONS SHOW INTEREST

Broadened horizons in appreciation of conservation were recognized in the participation by delegates of many nations to the United Nations Conference for International Organization in memorial ceremonies in honor of the late President Franklin Delano Roosevelt. These ceremonies were suggested by the Save-the-Redwoods League. Under the majestic redwoods of Cathedral Grove in Muir Woods National Monument, Calif., delegates assembled on May 19 to pay tribute to a great leader, during whose administration not only national park projects but many other conservation objectives were realized. Conference delegates also made pilgrimages to Yosemite, Sequoia, Grand Canyon, and other national parks of the West. They were impressed both with the grandeur of these places and with the governmental policy that assures their preservation for enjoyment. At the termination of the United Nations Conference, seeds of the giant sequoia, the General Sherman Tree, were made available to delegates who desired to take them to their native lands for planting. President Truman, en route to the Conference, spent part of June 22 at Mount Rainier National Park.

Efforts were continued by the National Park Service to stimulate action by the Government of Mexico toward the reserving of an area across the Rio Grande from Big Bend National Park, which would make this an international park. The regional director of region three

visited several Mexican national parks in the spring of 1945 and conferred with Mexican officials regarding the Big Bend International Park and the Coronado International Memorial projects.

Correspondence was carried on with officials at work on surveys and organization plans for national parks and national park authorities for England, Scotland, and Wales; with those of Kruger National Park of South Africa; and with park officials of Brazil.

PUBLIC NEEDS TO KNOW ABOUT POLICIES

The National Park Service looks upon itself as the guardian of perhaps the greatest living and testamentary trust ever established. The concept of conservation of a small portion of our land, not for consumption of its natural resources, but for its preservation to minister to the human mind and spirit, because of surpassing grandeur or other special and profound significance, is one almost unique to the United States of America. It is steadily gaining in interest and favor among other nations. Members of our staff returning from service abroad tell us that, even during the war, there has been much thinking and planning along these lines, particularly in Great Britain. Visitors from Latin-American countries report similar interest there.

To meet the responsibilities of its trusteeship satisfactorily, the Service is dependent on congressional support which, in the final analysis, must stem from public support. Both depend primarily upon satisfactory performance of its job and upon evidence that it is meeting the needs of the visiting public. But public approval rests not only on accomplishment but also upon understanding of Service objectives and upon satisfaction with their soundness and with progress toward attaining them.

The Service has been so occupied with carrying out the responsibilities placed on it by law, that it has had scant opportunity to keep the public informed about its fundamental policies. The millions of owners of the system are entitled to authentic information about their estate; why it exists, what it contains, where the units are situated; what principles of management are applied to it and the reasons for them. As travel to the national park system areas increases during the coming years, and more and more Americans enjoy the parks, it is the hope of the National Park Service that it can keep abreast of its obligations to tell the people of the value and the meaning of this great estate.

Information Relating to the National Park System June 30, 1945

Areas (classification)	State	Federal land acres	Approximate visitors fiscal year July 1, 1944-June 30, 1945	Approximate visitors 5-year average 1941-45
National parks:				
Acadia	Maine	28,291.07	12,908	163,470
Big Bend	Texas	691,338.95	2,312	(?)
Bryce Canyon	Utah	36,010.38	12,244	49,733
Carlsbad Caverns	New Mexico	45,626.59	131,338	167,890
Crater Lake	Oregon	180,290.33	44,056	124,994
Glacier	Montana	997,486.80	37,801	88,623
Grand Canyon	Arizona	645,084.31	74,170	196,662
Grand Teton	Wyoming	94,892.92	20,453	54,885
Great Smoky Mountains	Tennessee and North Carolina	460,882.46	535,106	756,696
Hawaii	Hawaii	173,404.60	381,914	344,947
Hot Springs	Arkansas	1,019.13	253,996	209,959
Ile Royale	Michigan	133,838.61	4,223	5,177
Kings Canyon	California	452,984.02	37,455	104,364
Lassen Volcanic	do	101,880.41	19,355	5,107
Mammoth Cave	Kentucky	50,547.61	45,576	90,957
Mesa Verde	Colorado	61,017.87	6,439	18,969
Mount McKinley	Alaska	1,939,199.04	(1)	(1)
Mount Rainier	Washington	241,219.92	145,317	284,813
Olympic	do	848,212.30	62,817	73,976
Platt	Oklahoma	911.97	201,124	201,258
Rocky Mountain	Colorado	252,625.87	228,862	392,553
Sequoia	California	385,100.13	64,682	157,826
Shenandoah	Virginia	193,472.98	153,944	394,765
Wind Cave	South Dakota	11,718.17	4,558	10,782
Yellowstone	Idaho, Montana, and Wyoming	2,213,206.55	93,279	269,945
Yosemite	California	756,294.65	139,701	295,430
Zion	Utah	94,241.06	44,405	94,463
Total		11,060,698.50	2,757,945	4,607,533
National historical parks:				
Abraham Lincoln	Kentucky	110.50	13,491	61,425
Chalmette	Louisiana	29.52	31,631	35,129
Colonial	Virginia	7,057.16	204,189	363,303
Morristown	New Jersey	958.37	114,965	122,730
Total		8,155.55	364,276	592,619
National monuments:				
Ackia Battleground	Mississippi	49.15	(1)	(1)
Andrew Johnson	Tennessee	17.08	14,632	(1)
Appomattox Courthouse	Virginia	968.25	4,150	18,015
Arches	Utah	34,089.94	486	1,581
Aztec Ruins	New Mexico	25.88	4,282	7,439
Badlands	South Dakota	122,812.46	9,917	91,706
Bandelier	New Mexico	27,048.89	7,044	8,174
Big Hole Battlefield	Montana	200.00	1,354	(1)
Black Canyon of the Gunnison	Colorado	12,040.55	2,681	6,318
Cabrillo	California	0.50	(1)	(1)
Canyon de Chelly	Arizona	83,840.00	427	1,186
Capitol Reef	Utah	33,068.74	(1)	(1)
Capulin Mountain	New Mexico	680.42	11,298	21,269
Casa Grande	Arizona	472.50	10,294	11,772
Castillo de San Marcos	Florida	18.51	136,236	172,926
Castle Pinckney	South Carolina	3.50	(1)	(1)
Cedar Breaks	Utah	6,052.20	6,256	7,906
Chaco Canyon	New Mexico	18,039.39	1,463	1,569
Channel Islands	California	1,119.98	(1)	(1)
Chiricahua	Arizona	10,529.80	4,500	6,878
Colorado	Colorado	18,120.55	10,333	12,508
Craters of the Moon	Idaho	47,540.70	2,684	8,611
Death Valley	California and Nevada	1,850,565.20	14,492	41,802
Devil Postpile	California	798.46	(1)	(1)
Devils Tower	Wyoming	1,193.91	5,165	17,523
Dinosaur	Colorado-Utah	190,801.65	1,835	3,333
El Morro	New Mexico	240.00	464	758
Father Millet Cross	New York	0.01	(1)	(1)
Fort Jefferson	Florida	86.82	(1)	(1)
Fort Laramie	Wyoming	214.41	2,672	4,371
Fort Matanzas	Florida	18.34	2,423	19,921
Fort McHenry	Maryland	47.64	297,263	414,213
Fort Pulaski	Georgia	5,427.39	(1)	(1)
Fossil Cycad	South Dakota	320.00		(1)

See footnotes at end of table.

Information Relating to the National Park System June 30, 1945—Continued

Areas (classification)	State	Federal land acres	Approximate visitors fiscal year July 1, 1944-June 30, 1945	Approximate visitors 5-year average 1941-45
National monuments—Con.				
George Washington Birth-place	Virginia.....	393.68	10,894	21,751
Gila Cliff Dwellings	New Mexico.....	160.00	(1)	(1)
Glacier Bay	Alaska.....	2,297,456.27	(1)	(1)
Grand Canyon	Arizona.....	196,051.00	(1)	(1)
Gran Quivira	New Mexico.....	450.94	376	1,289
Great Sand Dunes	Colorado.....	36,609.19	4,753	4,775
Holy Cross	do.....	1,392.00	(1)	(1)
Homestead	Nebraska.....	162.73	(1)	(1)
Hovenweep	Utah-Colorado.....	299.34	59	~141
Jackson Hole	Wyoming.....	173,064.62	(1)	(1)
Jewel Cave	South Dakota.....	1,274.56	(1)	(1)
Joshua Tree	California.....	655,961.33	9,515	17,961
Katmai	Alaska.....	2,697,590.00	(1)	(1)
Lava Beds	California.....	45,867.56	10,062	19,375
Lehman Caves	Nevada.....	639.31	928	1,822
Meriwether Lewis	Tennessee.....	300.00	5,023	8,812
Montezuma Castle	Arizona.....	521.41	3,335	5,373
Mound City Group	Ohio.....	57.00	(1)	(1)
Muir Woods	California.....	424.56	131,314	113,068
Natural Bridges	Utah.....	2,740.00	134	563
Navajo	Arizona.....	360.00	69	228
Ocmulgee	Georgia.....	693.48	29,667	37,539
Old Kasaan	Alaska.....	38.00	(1)	(1)
Oregon Caves	Oregon.....	480.00	1,369	(1)
Organ Pipe Cactus	Arizona.....	329,161.73	63,265	37,365
Perry's Victory	Ohio.....	14.26	47,097	29,359
Petrified Forest	Arizona.....	85,306.00	44,520	105,721
Pinnacles	California.....	12,817.77	4,194	11,863
Pipe Spring	Arizona.....	40.00	546	745
Pipestone	Minnesota.....	115.06	2,828	2,036
Rainbow Bridge	Utah.....	160.00	(1)	(1)
Saguaro	Arizona.....	53,669.24	4,810	8,167
Santa Rosa Island	Florida.....	9,500.00	456,725	364,627
Scotts Bluff	Nebraska.....	2,292.15	25,604	50,036
Shoshone Cavern	Wyoming.....	212.37	(1)	(1)
Sitka	Alaska.....	57.00	3,956	5,959
Statue of Liberty	New York.....	10.38	453,150	393,677
Sunset Crater	Arizona.....	3,040.00	2,496	6,660
Timpanogus Cave	Utah.....	250.00	20,559	12,678
Tonto	Arizona.....	1,120.00	3,312	4,844
Tumacacori	do.....	10.00	7,287	6,481
Tuzigoot	do.....	42.67	3,236	5,389
Verendrye	North Dakota.....	253.04	(1)	(1)
Walnut Canyon	Arizona.....	1,641.62	5,330	8,067
Wheeler	Colorado.....	300.00	(1)	(1)
White Sands	New Mexico.....	138,567.36	41,263	51,466
Whitman	Washington.....	45.84	(1)	(1)
Wupatki	Arizona.....	34,693.03	489	1,658
Yucca House	Colorado.....	9.60	8	51
Zion	Utah.....	33,920.75	(1)	(1)
Total		9,285,679.68	1,950,544	2,217,565
National military parks:				
Chickamauga and Chattanooga	Georgia and Tennessee.....	8,146.33	89,903	206,531
Fort Donelson	Tennessee.....	102.54	8,861	18,164
Fredericksburg and Spotsylvania County Battlefields Memorial	Virginia.....	2,420.15	33,865	76,518
Gettysburg	Pennsylvania.....	2,448.17	122,302	290,813
Guilford Courthouse	North Carolina.....	148.83	19,866	19,202
Kings Mountain	South Carolina.....	4,012.00	10,724	12,628
Moores Creek	North Carolina.....	30.00	2,768	3,918
Petersburg	Virginia.....	1,310.41	124,684	162,420
Shiloh	Tennessee.....	3,717.59	65,534	102,315
Stones River	do.....	323.86	15,045	7,606
Vicksburg	Mississippi.....	1,323.56	9,190	77,265
Total		23,963.44	502,742	977,380
National historic sites:				
Atlanta Campaign	Georgia.....	20.96	(1)	(1)
Federal Hall Memorial	New York.....	0.49	91,238	(1)
Fort Raleigh	North Carolina.....	16.45	8,950	21,671

See footnotes at end of table.

Information Relating to the National Park System June 30, 1945—Continued

Areas (classification)	State	Federal land acres	Approximate visitors fiscal year July 1, 1944-June 30, 1945	Approximate visitors 5-year average 1941-45
National historic sites—Con.				
Home of Franklin D. Roosevelt	New York	33.23	(1)	(1)
Hopewell Village	Pennsylvania	6,197.00	69,004	44,885
Jefferson National Expansion Memorial	Missouri	82.58	31,321	(2)
Manassas	Virginia	1,604.57	4,546	6,345
Old Philadelphia Custom House	Pennsylvania	0.79	22,701	13,367
Salem Maritime	Massachusetts	8.61	4,631	5,573
Vanderbilt Mansion	New York	211.65	11,058	14,461
Total		8,176.33	243,440	106,322
National battlefield sites:				
Antietam	Maryland	183.32	16,728	18,655
Brices Cross Roads	Mississippi	1.00	(1)	(2)
Cowpens	South Carolina	1.00	(1)	(2)
Fort Necessity	Pennsylvania	2.00	23,834	35,429
Kennesaw Mountain	Georgia	60.00	17,056	14,640
Tupelo	Mississippi	1.00	(1)	1,440
White Plains	New York		(1)	(1)
Total		248.32	57,618	70,164
National battlefield parks:				
Richmond	Virginia	684.44	17,824	(2)
National memorials:				
House where Lincoln died	District of Columbia	0.05	65,082	42,869
Kill Devil Hill	North Carolina	314.40	8,697	29,991
Lee Mansion	Virginia	.50	230,953	233,619
Lincoln Memorial	District of Columbia	.61	626,171	979,172
Lincoln Museum	do	.18	101,335	69,269
Mount Rushmore	South Dakota	1,686.40	37,148	126,427
New Echota Marker	Georgia	.92	(1)	(1)
Thomas Jefferson	District of Columbia	1.20	403,727	(1)
Washington Monument	do	.37	562,852	651,660
Total		2,004.63	2,035,965	2,133,007
National cemeteries:				
Antietam	Maryland	11.36	(1)	(1)
Battleground	District of Columbia	1.03	2,700	2,740
Custer Battlefield	Montana	757.84	14,071	26,496
Fort Donelson	Tennessee	15.34	(1)	(1)
Fredericksburg	Virginia	12.00	(1)	(1)
Gettysburg	Pennsylvania	15.55	(1)	(1)
Poplar Grove	Virginia	8.72	(1)	(1)
Shiloh	Tennessee	10.25	(1)	(1)
Stones River	do	20.09	(1)	(1)
Vicksburg	Mississippi	119.76	(1)	(1)
Yorktown	Virginia	2.91	(1)	(1)
Total		974.85	16,771	29,238
National Capital parks: § The park system of the District of Columbia.	District of Columbia, Virginia, and Maryland.	17,790.36	(1)	(1)
Parkways:				
Blue Ridge	North Carolina-Virginia	38,911.50	277,018	370,544
Natchez Trace	Tennessee, Alabama, and Mississippi	13,648.87	(1)	(1)
George Washington Memorial	Maryland and Virginia	2,458.68	(1)	(1)
Total		55,019.05	277,018	370,544
Total—National Park System.		20,473,415.16	8,224,152	11,104,673
National recreational area:				
Boulder Dam	Arizona and Nevada	1,680,133.33	298,524	442,328

See footnotes at end of table.

Information Relating to the National Park System June 30, 1945—Continued

Areas (classification)	State	Federal land acres	Approximate visitors fiscal year July 1, 1944-June 30, 1945	Approximate visitors 5-year average 1941-45
Projects:				
Everglades National Park.....	Florida.....			
Cumberland Gap National Historical Park.....	Kentucky, Tennessee, and Virginia.....			
Saratoga National Historical Park. ¹	New York.....	1, 864. 60	6, 584	20, 183
Monocacy National Military Park.....	Maryland.....			
Kennesaw Mountain National Battlefield Park.....	Georgia.....	3, 034. 21	17, 056	14, 640
Fort Frederica National Monument.....	Georgia.....		(¹)	(¹)
George Washington Carver National Monument.....	Missouri.....		(¹)	(¹)
Harpers Ferry National Monument.....	Maryland, Virginia, and West Virginia.....		(¹)	(¹)
Manuelito National Monument.....	New Mexico.....		(¹)	(¹)
Palm Canyon National Monument.....	California.....		(¹)	(¹)
Pioneer National Monument.....	Kentucky.....		(¹)	(¹)
Eutaw Springs National Battlefield Site.....	South Carolina.....		(¹)	(¹)
Coronado International National Memorial.....	Arizona.....		(¹)	(¹)
Spanish War National Memorial.....	Florida.....		(¹)	(¹)
Oglethorpe National Parkway.....	Georgia.....		(¹)	(¹)
Cape Hatteras National Seashore Recreational Area.....	North Carolina.....	74. 00	(¹)	(¹)
Olympic Public Works Project.....	Washington.....	43, 358. 36	(¹)	(¹)
Total.....		48, 331. 17	23, 640	34, 823
Grand total.....		22, 201, 879. 65	8, 546, 316	11, 581, 823

Areas (classification)	State	Federal land acres	Areas (classification)	State	Federal land acres
Recreational demonstration areas:			Recreational demonstration areas—Con.:		
Alexander H. Stephens.....	Georgia.....	940. 00	Raccoon Creek.....	Pennsylvania.....	5, 035. 38
Blue Knob.....	Pennsylvania.....	5, 136. 00	Roosevelt.....	North Dakota.....	71, 652. 15
Camden Hills.....	Maine.....	4, 962. 00	Silver Creek.....	Oregon.....	4, 092. 75
Catoctin.....	Maryland.....	9, 918. 28	Swift Creek.....	Virginia.....	7, 604. 84
Cuivre River.....	Missouri.....	5, 759. 00	Total.....		188, 188. 62
Custer.....	South Dakota.....	20, 403. 97	National historic sites in non-Federal ownership:		
Hard Labor Creek.....	Georgia.....	5, 804. 40	Gloria Dei.....	Pennsylvania.....	(¹⁰)
Hickory Run.....	Pennsylvania.....	13, 386. 44	Independence Hall.....	do.....	
Lake of the Ozarks.....	Missouri.....	16, 195. 94	Jamestown.....	Virginia.....	
Laurel Hill.....	Pennsylvania.....	4, 026. 00	McLoughlin House.....	Oregon.....	
Mendocino Woodlands.....	California.....	5, 425. 58	Saint Paul's Church.....	New York.....	
Montserrat.....	Missouri.....	3, 441. 00	San Jose Mission.....	Texas.....	
Otter Creek.....	Kentucky.....	1, 373. 21			
Pine Mountain.....	Georgia.....	3, 031. 68			

¹ Travel figures not available or maintained.² Travel figures available for less than 5 years.³ Closed to visitors.⁴ Established by Presidential proclamation, Mar. 15, 1943.⁵ Included in travel figures for adjacent battlefield site, military park, or historical park.⁶ Travel included under "Memorials."⁷ Includes Chopawamsic Area, Va., and Chesapeake & Ohio Canal, Md.⁸ Administered by Service pending final establishment.⁹ Includes 2,250,755 military visitors.¹⁰ 1.20 acres federally owned; 1.53 acres owned by Old Swedes' Church.

Office of Indian Affairs

WILLIAM A. BROPHY, *Commissioner*¹



DURING the fiscal year 1945, under difficult conditions occasioned by the war, the Office of Indian Affairs has continued to serve its dominant purpose—to protect the interests of 400,000 Indians and Eskimos in the United States and Alaska, and to aid them in becoming economically independent.

While there have been losses and costly postponements, there have been significant gains also. Owing to servicemen's allotments, to the increased quantity and value of their agricultural products, and to the wages earned by more than 40,000 Indians who have left their reservations to work in various industries, the total income of Indians has been greater than ever before. The acquaintance with a wider world and a higher standard of living acquired by many of the home folk, together with a more alert awareness and increased self-confidence of 25,000 young men and women returning from the armed services, may well prove a powerful stimulus to Indian progress.

A fundamental problem, however, is accentuated by this situation. Even with the most efficient use, Indian resources in some areas are far from sufficient to provide a decent livelihood for all Indians. A portion of the 65,000 who left their homes to fight and work, and who are now returning, can find opportunity on their reservations; but thousands cannot, and thousands of others who remained at home are in the same predicament. Since Indian resources cannot be sufficiently augmented to support the population, which is increasing rapidly, many thousands of Indians must be helped to find economic opportunity and acceptance in the general national economy.

So long as thousands of Indians exist below the subsistence level on poverty-stricken reservations, so long as employment opportunities are scarce, Federal expenditures for program services to Indians cannot be appreciably decreased.

¹ John Collier served as Commissioner of Indian Affairs until March 1945. William A. Brophy was appointed Commissioner and appointment was confirmed by the Senate the same month.

PHYSICAL RESOURCES

LAND

The Office of Indian Affairs has jurisdiction over more than 56,000,000 acres of land. Of this total, about 7,000,000 acres are classified as agricultural, with a valuation of \$90,000,000; forest lands aggregating more than 16,000,000 acres, are worth, including the standing timber, approximately \$170,000,000; open grazing lands, constituting some 32,000,000 acres, are valued at approximately \$90,000,000. The homes and farm buildings on these lands are so poor, in general, that their value may be assessed at no more than \$15,000,000.

Acquisition and Consolidation

As the land base on most reservations is inadequate for the support of the entire population, and much of it is rendered almost useless to Indians by the fractionating process of inheritance, the Indian Service, insofar as possible, has continued its program of land acquisition and consolidation.

During the past fiscal year 157,000 acres of land, formerly opened for settlement but unclaimed, were restored to the Red Lake Reservation in Minnesota, and 12,767 acres were returned to tribal ownership on the Wind River Reservation in Wyoming. In all, 257,000 acres of land were restored to Indian use.

Many tribes have been giving serious attention to the matter of providing land for their returning soldiers, and to this end tribal funds totaling \$177,000 were used last year in purchasing 63,000 acres on 12 reservations, some of the acquired land being from Indian estates complicated by heirship. With their own funds the Southern Utes reacquired 40,546 acres at a cost of \$83,000. During the year 10 tribes requested authorization to use \$250,000 of their funds for the purchase of complicated heirship tracts and lands formerly owned by Indians.

Progress is also being made in the rearrangement of land holdings through the exchange of heirship interests for the right to use tribal lands. For example, on the Rosebud Reservation in South Dakota individuals have returned 21,000 acres of their allotted and inherited lands to tribal ownership in exchange for certificates of interest in the Rosebud Tribal Land Enterprise. By this means members may acquire workable farming and grazing units in exchange for scattered fractional interests. The Enterprise is now managing 38,000 acres of allotted and tribal land, and more than 400 proposed exchanges are awaiting the availability of personnel to complete the transactions.

On Cheyenne River Reservation in South Dakota, the tribe is encouraging its members to convey their lands to tribal ownership

in exchange for assignments. All interest in 521 allotments and the undivided heirship interest in 246 allotments were thus conveyed during the past year, and 450 exchange assignments were issued. As a result, many members of the tribe have been enabled to engage in, or to enlarge, farm and livestock operations.

The marked success of this exchange procedure on these reservations reflects the Indians' own understanding of their land-use difficulties; and their efforts to solve their land-tenure problem are being closely watched by other tribes.

Oil and Minerals

Since Oklahoma's first commercial oil well, on Cherokee Indian land, came into production 48 years ago, the restricted lands of the Five Civilized Tribes have produced 459,810,138 barrels of oil, in addition to tremendous quantities of associated dry gas and casinghead gas. In the same time oil lands of the Osage Reservation have yielded 584,347,797 barrels.

The depletion of petroleum resources in Oklahoma is only partially offset by discoveries in other areas, notably on the Wind River Reservation in Wyoming, which produced 2,457,251 barrels in the fiscal year 1945, and on the Blackfeet Reservation in Montana, which yielded 2,028,019 barrels.

The total output of all Indian oil wells during the year exceeded 23,000,000 barrels. There are now 11,400 oil wells on restricted Indian lands, and 6,500 oil and gas leases are in force, covering 1,700,000 acres and involving Indians of 35 tribes in 10 states. Forty-five lease sales were held during the past fiscal year, and more than 1,000 leases were sold.

During the war period, lead and zinc held a high place in the list of strategic minerals, and the mines on restricted Quapaw lands produced some 415,000 tons of lead and zinc concentrates, valued at over \$38,000,000. In order to produce this amount of concentrates in a short period of time it was necessary to deplete reserves that would not normally have been mined at such an accelerated rate. At the end of the fiscal year there were 56 lead and zinc leases in force, covering 5,726.59 acres. Production for the year amounted to 78,248 tons of lead and zinc concentrates, which was 23.9 per cent of the production from the Tri-State district.

Forest and Grazing Lands

It is conservatively estimated that there are 35,000,000,000 feet of standing timber on 16,700,000 acres of Indian lands located in 19 States, approximately 80 percent being considered suitable for lumber. This constitutes about 2 percent of the estimated total volume of standing timber in the United States.

Of the 528,472,000 feet of timber cut and removed from Indian reservations during the calendar year 1944, the major portion has been used directly in war production. Many relatively small sales were made to provide timber for as many sawmill operations as practicable, and the sale areas have been selected and controlled according to the principles of sustained-yield management.

The Indians, through their tribal sawmill enterprises, produced approximately 30,954,500 feet of lumber during the past year. These enterprises are located on the Menominee Reservation in Wisconsin, the Red Lake Reservation in Minnesota, and the Navajo and Fort Apache Reservations in Arizona. Production was curtailed to some extent by limited labor and equipment.

White pine blister rust threatens the development of white pine in a control area of 108,870 acres, most of which is located in the Lake States. In cooperation with the Bureau of Entomology and Plant Quarantine, Department of Agriculture, 80,182 acres have been given initial treatment and 48,398 acres have been reworked, Indian women performing much of the labor involved. The pine bark beetles continue to cause considerable loss of ponderosa pine on Indian reservations in the far West. While forest management minimizes the depredations of the beetles, special control programs are necessary. These were not possible during the war, but have been planned for the postwar period.

Fortunately, the weather during last year's fire season was very favorable, and only 885 fires were reported, as compared to the annual average of 1,038 for the past ten years; but the areas affected totaled 127,742 acres, as compared to the annual average of 115,830.

During the calendar year 1944 approximately 44,000,000 acres of forest and open range lands on Indian reservations were utilized for grazing, providing forage for about 9,000,000 cattle months, with a value of approximately \$1,900,000. Of this area, 34,000,000 acres were used by Indian stockmen.

Maximum production has been maintained on Indian range lands in keeping with the principles of conservation, and overstocking has generally not been permitted. On the Navajo, Hopi, and Papago Reservations, however, overgrazing continues to be a difficult problem. Range lands on those reservations will not support a sufficient number of livestock to provide a decent living for all the Indians. Consequently the reduction of flocks and herds to the estimated grazing capacity of the land is proceeding slowly.

Soil Conservation

During the war years, farming, of necessity, has been on an exploitative basis. As a result, the nation's basic resource has decreased, and Indian lands have suffered with the rest of the country. The great

demand for peanuts, cotton, corn, and other row crops requiring clean cultivation, has resulted in annually increased acreages of these crops. Consequently, pastures and grass-crops have been much reduced, and rotations, that maintain the organic content of soil, have been postponed. Removal of the protective vegetative cover during a major portion of the year has resulted in severe erosion by wind and water.

Through conservation during the past year, soil depletion under row-crop farming in the South and Southwest has been checked to a considerable degree, in spite of limited facilities and decreased funds and personnel. Almost 27,000 acres of Indian lands were contoured; legumes were planted on 22,450 acres; strip-cropping was practiced on 13,670 acres; 4,290 acres were converted to improved pastures; 397 miles of farm terraces were built. Application of the above practices resulted in a 35 percent average increase in yield, which is only a portion of the benefit derived, inasmuch as the soil is retained in place and future productivity is assured.

As a result of the war demand from 1917 to 1921, approximately 200,000 acres of the finest Indian grazing land in the Great Plains were plowed for wheat, and less than 2 percent of it has revegetated satisfactorily. During the past year steps were taken to forestall a repetition of such land destruction as that which produced the dust bowl of the middle 1930's. Insistent demands have been made for plowing virgin sod land for flax, as the growers did not want the land that had been cropped and abandoned during the first World War. The Indian Service has cooperated to the fullest extent in securing additional flax acreage, but only under safeguards that would protect the basic soil resources. Definite soil-conserving practices were specified for each major soil class, with the requirement that land be reseeded to an adapted grass species upon cessation of cropping.

In the great Northwest wheat region, the alternate-year clean-fallow system of wheat farming has been standard practice since the country was settled. Under this system, the soil surface has a protective vegetative cover during only 3 or 4 months out of each 2-year period. As a result, the best one-third to one-half of the rich prairie topsoil has been lost by erosion. Conservation plans now in effect on 633 Indian farms, totaling 130,500 acres, have brought about many desirable improvements. A leguminous cover, instead of clean fallow, has been introduced between wheat crops on 15,000 acres; stubble, loose mulch, and rough tillage are now applied on 43,500 acres; crop rotations are practiced on 66,000 acres; 1,150 acres, formerly plowed each year, have been converted to grass. These changes have increased production, reduced erosion, and are actually restoring soil fertility.

In the Southwest, destructive flood waters have been diverted and spread on 39,150 acres of Indian range lands. This has been a major

contribution to the checking of siltation in reservoirs, and has increased carrying capacities by 600 cow years. Improved irrigated pastures, totaling 470 acres, have provided forage for an additional 1,200 cow years. Results from the reseeding of 24,895 acres of range land are not reflected in this increased carrying capacity, but if the seeding is successful, it should provide forage for an additional 600 cow years. Seedings made in previous years, have, however, resulted in increased forage equal to about 300 cow years this season.

It is difficult, if not impossible, to estimate in dollars the loss of soil from Indian land. The reduction in fertility results not only in decreased yields to the farmer, but in the filling of streams and reservoirs. There is ample evidence that the losses have been accelerated during the war; and while the conservation practices here described are helpful, they do not solve the problem involved. A soil restoration and conservation program on an increased scale is in order, and plans have been made to this end.

Land Released for Military Use

During the war, over half a million acres of land passed out of Indian ownership to be used by the Government for air bases, gunnery ranges, bombing practice areas, etc. The permanent loss of so great an acreage would be a heavy blow to Indian economy, and it is hoped that not only the half million acres devoted to military purposes, but additional areas of grazing land also, may be made available for Indian use.

Colorado River Resettlement

Although, by provision of the act of 1865, the Colorado River Reservation was set up "for the Indians of said river and its tributaries," no colonization of Indians from the tributary areas was found feasible during three-quarters of a century, owing to the general desert condition of the land and the lack of irrigation facilities.

With the completion of the Headgate Rock Dam and distribution system at the outbreak of the war, colonization became feasible; and during February 1945, the Council of the Colorado River Tribes adopted an ordinance opening the southern three-fourths of the reservation to colonization by Indians of the Colorado River watershed. During May 1945, the War Relocation Authority returned to the control of the Indian Service about 2,000 acres of subjugated land in the southern area.

The Indian Service entered into negotiations with the Hopi Indians, who had expressed interest in migrating to the Colorado River Reservation, and applications were received from 20 families for permits to occupy 40-acre units to be available September 1, 1945.

EXTENSION ACTIVITIES

Livestock

As only about one-eighth of the total Indian land base may be classified as agricultural, livestock raising is of necessity the chief industry of the Indians. Accordingly, during the past year, as throughout the past decade, it has been one of the principal functions of the Indian Service to aid Indians in increasing the numbers of their stock, in improving its quality, and in establishing efficient marketing methods.

Livestock numbers have been, and are being, steadily increased. In 1932 Indians owned a total of 170,700 beef cattle and 11,300 head of dairy stock. That year total income from sales of livestock and livestock products was \$1,229,800. By 1943 the number of their beef cattle had been doubled, their dairy herds had increased to more than 50,000 head, and the total cash income from both was nearly \$14,000,000. In the calendar year 1944 the number of Indian-owned beef cattle was 361,300, the dairy cattle numbered 50,700, and the total income from these sources was \$15,039,000, while the livestock and livestock products consumed at home had a market value of \$7,431,410.

It is a much simpler matter to increase the numbers than to improve the quality of the stock. During the past year continued efforts were made to aid Indians in securing better sires with each successive purchase and in culling inferior animals. As a result, a marked improvement is to be noted in many Indian herds. Some reservations are now operating breeding cattle herds for the production of superior bulls. At Fort Apache and San Carlos registered cows are being artificially inseminated. It is found that about 10 times the normal number of calves may thus be sired by one outstanding bull, and greater uniformity of quality may be obtained.

Improved marketing methods have aided greatly in augmenting Indian income from livestock. To this end cooperative livestock associations have been organized on most reservations, and 149 of these were in operation during the past year. Usually livestock are owned individually, but are managed and marketed cooperatively.

Improving Navajo Sheep

During the past quarter of a century there has been a steady decline in the quality of Navajo rugs because of a diminishing supply of suitable wool. The Indian Service has introduced fine-wooled rams for cross-breeding with native Navajo ewes to increase unit production and improve the quality of wool and lambs for the market. This has resulted in raising the market value of both wool and lambs, but the wool still lacks some of the qualities desirable for hand-weaving.

The laboratory at Fort Wingate, N. Mex., operated jointly by the Bureau of Animal Husbandry of the Department of Agriculture and the Indian Service, is endeavoring to develop a type of sheep better suited to the economic needs of the Navajo Indians than either the fine-wooled or old-type Navajo sheep. Although only three generations of cross-bred offspring have been produced, definite progress has been noted. Last year the average clean-wool production of the cross-bred ewes in the experimental flock was almost 100 percent greater than the 1936 production of the foundation Navajo ewes; but at least eight generations will be required to establish the desired type.

Agriculture

In the Southern and Southwestern States, forage is produced chiefly through the development of pastures. On most northern reservations the critical factor in the livestock industry is the production and storage of feed for the winter months. In 1944, 436,794 tons of forage crops, with a valuation of \$4,793,911, were harvested on 396,600 acres of Indian land.

Although Indians in general depend chiefly upon livestock for their cash income, other cash crops have been increasing during the past decade. In 1943, 370,000 acres of cereal crops yielded 3,780,000 bushels. In 1944, only 340,000 acres were planted, but the yield of cereals increased to 4,839,500 bushels with a market value of nearly \$5,000,000. Other field crops were valued at \$3,682,400, while tree fruits, nuts, and berries, sold and consumed, were worth \$775,600.

The Indian Service has continued to stress the importance of gardening. In 1944, 31,800 families raised gardens, the home-consumed produce therefrom being valued at \$1,280,000.

Experimental Work at Sacaton

At the United States field station, Sacaton, Ariz., the Indian Service cooperates with the Bureau of Plant Industry, Department of Agriculture, in conducting experimental work on crops in the Southwest. During the war years research work has been modified so as to contribute to war needs as much as possible.

New strains of cotton, developed at the Sacaton station, have contributed millions of dollars to the income of Southwestern cotton growers, and other promising strains are now being worked out. Greater attention is being given to the long staple varieties, such as American-Egyptian and the SXP; and the station is taking the lead in furnishing an adequate supply of reliable seed for growers. Valuable contributions have been made to the knowledge of cotton diseases as a result of investigations at Sacaton. Worthwhile work is also being done with flax, and pasture experiments are being conducted to test the suitability of various grasses, clovers, and other forage plants.

Home Extension Work

The home-extension program of the Indian Service, designed to assist Indians in making better use of increased production and income, operates principally among Indian women. It is concerned largely with food conservation and nutrition, although clothing, sanitation, living expense budgets, and furniture-making also receive attention. The responsiveness of Indian women to this type of service is indicated by the fact that food canning has increased from 354,000 quarts in 1932 to 3,600,000 quarts in 1944; while in the same period the drying of foods has increased from 803,700 pounds to 1,590,000 pounds.

4-H Clubs

As the training of youth largely determines the attitudes and ideals of maturity, Indian Service extension workers have continued to promote 4-H Clubs among Indian youth as a part of the national movement. 4-H Club work supplements classroom teaching with practical experience in agriculture, stock-raising, and home-making, and serves to develop leadership among Indian boys and girls. It also aids greatly in persuading parents to adopt improved cultural and farm-management practices. The interest in the movement among Indian boys and girls is evidenced by the increase in enrollments from 3,871 twelve years ago to 12,916 in 1944.

Credit Without Money

The creation of a revolving cattle pool in 1934, as a result of drought conditions, has proved to be a wise and profitable venture. During that disastrous year of grassless ranges, the Government purchased large numbers of cattle to relieve stricken stockmen, and as Indians in some areas had feed and needed cattle, arrangements were made with the Federal Surplus Relief Corporation and the Department of Agriculture whereby high-grade and purebred cattle were turned over to the Indian Service. These were loaned to Indians on contracts providing for repayment in kind; and it was planned that cattle, when repaid, would be loaned on the same basis to Indians on reservations which were not originally included in the program.

The revolving cattle pool began with about 40,000 head. At the end of 1944 more than 60,000 head had been repaid and recontracted, and about 12,000 had been transferred to reservations where the Indians were unable to participate in the program at the beginning. The cattle pool has served to save thousands of America's foundation stock and has enabled about 10,000 Indians to engage in the cattle business.

Money Credit

Adequate financing became available to Indians for the first time when the initial appropriation was made for the revolving loan fund authorized by the Indian Reorganization Act of 1934.

Loans are made by the United States to Indian chartered corporations, unincorporated cooperative associations, and individuals. Funds thus acquired by tribes and associations may be used in making loans to members. Repayments are returned to the fund and become available for further loans. The fund authorized was \$12,000,000, and thus far a total of \$4,428,400 has been made available. Up to and including the fiscal year 1945 the United States has made commitments aggregating \$7,631,712.48. Of this amount \$5,533,082.48 had been advanced, while a total of \$2,532,798.23 had been repaid.

The repayment record of the Indians has been improving steadily. In 1941 the percentage of delinquencies was 7.64; in the following year it decreased to 4.95; in 1943 it was 3.41. Last year only 2.94 percent of the amount due on loans was delinquent.

ENGINEERING**Construction**

Exclusive of irrigation works, roads, sidewalks, landscaping, street lighting, and equipment, the physical plant of the Indian Service consists of nearly 15,000 buildings worth \$50,000,000, with a replacement value of twice that amount; more than 400 water and sewerage systems valued at about \$8,000,000; 15,000 wire-miles of telephone lines worth approximately \$1,600,000; and 181 radio transmitters in a system valued at \$60,000.

Since Pearl Harbor, funds and manpower as well as available materials have been insufficient to maintain these facilities in a good state of repair, and it is estimated that more than 6 million dollars will be required to put them in such a condition that a million and a half dollars a year will be sufficient to maintain them. During the past 3 years, funds for repair and maintenance have been reduced to half that amount.

In view of postwar programs, the need for additional buildings is urgent, and the need for new hospitals, schools, cottages, dormitories, utility plants, extensions, and modernizations, will be made the basis of requests for annual appropriations. The greatest present need is for funds to make surveys and prepare plans for necessary postwar construction.

Reservation Roads

The roads constructed on Indian reservations during the past decade have greatly aided the Indians in expanding their food production for war use, and have facilitated the transportation of critical

var materials found on reservations, such as timber and various minerals. During the war, only access roads to sources of such materials have been built—a program for which expenditures have exceeded a million dollars.

The capital investment represented by some 18,000 miles of roads and trails on Indian lands is approximately \$50,000,000. As a result of inadequate maintenance, it is estimated that the loss on the original investment from Pearl Harbor to VE day has been at least \$5,000,000. The cost of construction and reconstruction necessary to complete efficient transportation facilities on Indian reservations has not been accurately computed, owing to lack of funds for the necessary surveys; but reservation superintendents report that additional roads are greatly needed.

Irrigation

On many of the reservations, particularly west of the ninety-seventh meridian, irrigated land plays an important part in the economy of the Indians. There are at present approximately 840,000 acres in over 250 Indian Service projects that are supplied with irrigation facilities. About one-fourth of this land is in white ownership. This irrigated area compares with about 4,000,000 acres served by Bureau of Reclamation projects, and with a total of 355,000,000 acres of agricultural land in the United States.

The present investment in Indian Service irrigation projects is about \$67,000,000, and it is tentatively estimated that about \$93,000,000 will be needed for the completion of facilities necessary to serve a total of 1,650,000 acres of irrigable Indian land. About \$30,000,000 of the total investment would be chargeable to power development, leaving an average cost of less than \$80 per acre for irrigation purposes.

The value of crops grown on irrigated Indian lands in the calendar year 1944 exceeded \$30,000,000, approximately half the total cost of constructing the irrigation projects involved.

The principal immediate need is for the completion of surveys of all potentially irrigable lands, after which the ultimate area of each project can be accurately determined and plans can be formulated for development. During the fiscal year 1946 as much of this work will be done as may be possible within the limitation of available funds and manpower.

INDIAN CLAIMS

The California Land Claims

In December 1944 a judgment was entered in the United States Court of Claims, allowing the California Indians to recover from the United States \$5,024,842.34, in partial satisfaction of claims arising from the Senate's failure in 1852 to ratify 18 treaties made with these

tribes. Under these treaties the Indians ceded 75,000,000 acres of land, in return for which they were promised definite reservations aggregating 8,619,000 acres. They received only 624,000 acres, much of it poor and unproductive land. The judgment finally awarded to them represents the difference between the estimated value of lands, goods, and services promised them under the treaties, and the cost of services since rendered to them by the Federal Government. This amount has been placed in the Treasury to the credit of the Indians, to draw interest at 4 percent per annum, and appropriations from it will be authorized by Congress for the benefit of the Indians.

The Menominee Swamp Lands

Litigation concerning the Menominee Reservation, Wis., was settled in June 1945 when the Federal Government paid the State of Wisconsin \$1,590,854.50 for 33,870.23 acres of swamp lands within the boundaries of the reservation. When the treaty of 1854 was signed with the Menominees, this land was included in the forest area reserved to the Indians, but the State of Wisconsin claimed prior rights under the Swamp Land Act of 1850. The State's claim was upheld, and in order to fulfill the terms of the treaty with the Menominees the United States acquired the land by purchase, to be held in trust for the tribe. The Indians elected to take the swamp lands rather than a cash payment because the timber on these lands was necessary to maintain their lumber operations on a sustained yield basis.

The Sioux Pony Claims

Reexamination of claims for losses of personal property suffered by the Sioux Indians more than 60 years ago was completed during the year, and it was decided that an additional sum of \$101,630 should be awarded to the claimants. A bill to authorize the appropriation of this amount was passed on June 30, 1945. These claims for the loss of ponies, wagons, guns, and other personal property originated during and after the Indian war of 1876, when the Army seized or destroyed the possessions of friendly and neutral Indian bands as well as those of the hostiles. Horses were taken wherever found, and most of the claims presented were for these horses. In 1889 and 1891, the sum of \$416,260 was appropriated for the payment of these claims, and in 1932 a further payment of \$19,357 was authorized, although many claims were disallowed at that time.

The Northwestern Shoshone Decision

A Court of Claims decision against the Northwestern bands of Shoshone Indians was upheld by the Supreme Court in March 1945. The Shoshones had asked for \$15,000,000 in compensation for lands relinquished to White occupation, but the Supreme Court held, in a

5-4 decision, that the Treaty of Box Elder in 1863, which granted rights-of-way across the Shoshone country, did not show intent to recognize Indian title to the territory involved.

The decision was notable for the concurring opinion of two of the justices, who pointed out the inadequacy of judicial decisions in cases of this kind, and in substance called on the Congress to provide other machinery and other remedies. The justices concluded that a moral obligation rests on the whites to do for the Indians "what in the conditions of this twentieth century is the decent thing to do."

An Indian Claims Commission

During January 1945, bills were introduced in the House of Representatives to set up an Indian Claims Commission for the purpose of investigating all Indian claims—legal, equitable, and moral—and disposing of them finally within a period of ten years.

The Indian Office has long urged the creation of such a commission as a means of expediting the solution of a vital problem.

HUMAN RESOURCES

EDUCATION

The war caused the greatest disruption of Indian life since the beginning of the reservation era. Thousands of young men and women left high school to join the armed forces, and hundreds of youngsters took jobs. Thousands of Indian families left the reservations for war employment, usually taking their children with them. Consequently there has been a progressive decrease in school attendance at all levels, as the following table shows:

	1942	1943	1944	1945
Nonreservation boarding schools.....	6, 513	5, 680	5, 363	5, 550
Reservation boarding schools	5, 609	5, 268	5, 162	5, 730
Day pupils in boarding schools.....	1, 697	1, 296	1, 348	1, 531
Special consolidated schools.....	4, 150	3, 409	3, 600	3, 605
Day schools.....	7, 870	6, 554	6, 346	6, 086
Total.....	25, 839	22, 207	21, 828	22, 502

Most centers of war industry to which Indian families moved were seriously overcrowded, and housing and school facilities were inadequate. In some places local school authorities discouraged attendance of Indian children at public schools. Indians are not aggressive, and many families have yet to reach the conviction that education is a precious heritage to be obtained for the children at whatever cost to the parents. Therefore a little discouragement was enough to keep many Indian children out of school. In some areas this resulted in an increased enrollment in Federal boarding schools.

The educational field agent, whose duty it is to encourage public school attendance by Indian children, has in many cases extended his responsibility in an endeavor to pave the way for admission of these Indian children into the public schools of the adjacent area. Since there has been no concentrated movement by Indian families, the geographical spread of these newer problems of school attendance has tended to nullify the effectiveness of such endeavors.

Much of this loss of education is irreparable, for most young Indians are not yet ready to place the need for education above the opportunity to earn wages, to marry, or to assume in other ways the responsibilities of adulthood. Therefore it is doubtful if many of the older children will return to the classroom.

On the other hand, Indians in the armed forces have been learning the value of education. Hundreds of young men and women, returning to their homes on furlough, have emphasized the promotional advantage they have enjoyed as a result of vocational training received in Indian Service Schools, or lamented their failure to obtain such training when they had the opportunity. The armed forces have been quick to recognize and make use of the technical skills gained by young Indians in the vocational schools of the Indian Service and in the Civilian Conservation Corps camps. Similarly, those boys and girls who entered war industries on the strength of their vocational training have realized the advantage they possess; and these have advertised on the reservations the need for Indians to make the most of educational opportunities offered in Federal schools.

During the year, the Navajo tribe, the education of whose children has been seriously neglected by the Federal Government, demanded by resolution that the United States fulfill its pledge given in the Treaty of 1868 to provide a classroom and teacher for every 30 children of school age. There are today almost 20,000 Navajo children between the ages of 6 and 18, and the school facilities on the reservation will care for less than 60 percent of them. During the war period the lack of road maintenance and the limitations on tires, gasoline, and school bus replacements have interfered seriously with the maintenance of the day schools. As a result, the largest enrollment ever recorded has crowded into the boarding schools of the area, and it has been necessary to turn away hundreds of children whose parents wished them to have the advantages of education.

Inadequate transportation for students has made it necessary to close day schools on several other reservations. The end of the war may permit the replacement of school buses, and as the transition to peacetime economy proceeds, funds may be made available for the restoration of needed road maintenance and construction.

It is still too early to predict the part which may be played by the vocational schools of the Indian Service in the training to be offered

under the several veterans' bills. Nine Indian Service boarding high schools have been accredited by State vocational directors for training under the G. I. Bill of Rights, and under Public Law 16, which covers the retraining of disabled veterans. During the year just past only five of these schools have received enrollees under either of these acts; but, in view of reservation sentiment in many areas, it is believed that an increasing number will apply to the Federal schools in the year ahead.

During the past year half of all the food, both meats and vegetables, used in the Indian Service boarding and day schools, was raised in school gardens, or on school farms and ranches, through the cooperative effort of students, parents, and employees.

During the year four significant publications have issued from the presses of Indian schools: *The Hopi Way* by Laura Thompson and Alice Joseph; *Pueblo Crafts*, by Ruth Underhill; *Iroquois Crafts*, by Carrie Lyford; and *Education for Action*, edited by Willard A. Beatty, Director of Education. The last-named volume, a compilation of articles from the Bureau's fortnightly publication, *Indian Education*, presents a summary of the philosophy, policy, and practice of Indian schools.

HEALTH

The United States Indian Service offers medical attention to more than 400,000 beneficiaries of the Federal Government in the continental United States and Alaska. This is the only agency that makes available to its clientele complete medical attention throughout the life-cycle of the individual. The activities of the health service include health education, disease- and accident-prevention procedures, palliative treatments, rehabilitation, and sanitation.

During the fiscal year 1945 there has been increasing community participation in health activities throughout the service; and health councils, representing the people, are active on a number of reservations.

There are at present 77 hospitals and sanatoria with a bed capacity of 4,064. The Indian Service also has contracts with a number of State, county, and private hospitals. During the past year 750,000 out-patient treatments were given, and 40,000 patients were hospitalized with a total of 865,590 in-patient days. Forty percent of the cases involved operations, of which half were major. A conservative estimate of the annual value of these services at current rates would be no less than \$15,000,000.

As the Indian Service is not a war agency, war activities and private practice have drawn heavily on its health personnel, temporarily limiting its activities to curative and palliative measures. This situation will improve rapidly in the postwar period.

WELFARE

Despite all employment opportunities, it has been necessary to give relief to needy Indians. Although the number of cases has been reduced, available funds have been insufficient, and the problem of relief during the coming fiscal year will be even more serious.

Much attention has been given to the matter of rendering necessary services to veterans and to those returning from outside employment. The Indian Service makes available to the Indian veteran all information concerning benefits to which he is entitled under veterans' legislation, and urges him to take advantage of the provisions which will help him to continue his education, or to establish himself in business, agriculture, or industry.

During the past year the Territory of Alaska enacted three laws removing discrimination against the natives in the matter of mothers' pensions, in dealing with juvenile offenders, and in the matter of admission to hotels and other institutions serving the public.

More and more tribes and tribal councils are adopting resolutions providing that Indian custom marriage and divorce shall no longer be recognized. In accordance with the request of the Klamath Indian business committee, the Congress passed a law in December of last year which abolishes Indian custom marriage and divorce on the Klamath Reservation.

During the year the State of Iowa enacted a law providing aid to dependent children for Indians of the Sac and Fox Reservation.

Law and order problems have increased during the year, and juvenile delinquency, both on and off the reservations, has become a major problem.

EVALUATIONS**INDIAN RESOURCES**

The 56,000,000 acres of Indian lands, constituting about 3 percent of the total area of the United States, are estimated to be worth \$260,000,000.

Standing timber on Indian lands, estimated at 35,000,000,000 feet, and valued at approximately \$90,000,000, is about 2 percent of the total volume of standing timber in the United States.

No estimate of the value of oils and minerals on Indian lands is available.

Indian livestock, numbering more than 361,000, is worth approximately \$40,000,000, as compared with 82,000,000 head for the entire country with an estimated valuation of \$5,500,000,000.

The physical plant of the Indian Service is valued in excess of \$60,000,000. Roads on Indian lands represent an investment of \$50,000,000.

Indian Service irrigation projects serve 840,000 acres of land, three-fourths of which is owned by Indians. This total compares with 28,000,000 acres served by all irrigation projects in the United States, according to the 1940 census report. The present investment in Indian irrigation projects is \$67,000,000, to be compared with a total investment of more than \$1,000,000,000 for the United States, according to the census of 1940.

SERVICES TO INDIANS

While it is impossible to place a money valuation on all services rendered to Indians by the Office of Indian Affairs, it may be stated with accuracy that for each dollar spent on extension activities in agriculture and stockraising, \$46.80 was realized by the Indians in 1944.

Health services rendered to Indians by the Office of Indian Affairs, if paid for at current rates, would cost \$15,000,000 annually.

According to the latest bulletin published by the Office of Education, 24,562,473 pupils were enrolled in the public schools of the Nation for the school year 1941-42, with an average attendance of 21,031,322. The total expenditure for that year was \$2,067,660,387, and on the basis of average attendance, the cost per pupil was \$98.31.

During the same period, 32,658 pupils were enrolled in schools maintained by the Indian Service, with an average attendance of 26,617. Total expenditures for the maintenance of these schools was \$4,632,610 and the cost per pupil, on the basis of average attendance, was \$174.05. In this connection it should be noted that a rather large percentage of Indian pupils attend boarding schools, where they are fed, clothed, and housed. Also, in practically all Indian Service day schools, it is necessary to serve a substantial noon meal; and, as Indians usually live in poorly developed regions and are scattered over large areas, transportation must be furnished.

INDIANS IN THE WAR

By the Spring of 1945, the number of Indians serving in the armed forces had reached a total of 24,521, exclusive of officers. These were in all branches of the service, in every part of the world. Several hundred Indian women have enlisted in the women's reserves, and almost every reservation and tribe lists members of the WAC, the WAVES, the Army Nurse Corps, or the Cadet Nurse Corps.

Indians have won nearly all decorations, including two awards of the Congressional Medal of Honor. The first of these was won by Lt. Ernest Childers, Creek, in 1944, and President Roosevelt presented the second to Lt. Jack C. Montgomery, Cherokee, of Sallisaw, Okla., at the White House in January 1945. The Office of Indian

Affairs has recorded 51 awards of the Silver Star to Indians, 70 of the Air Medal, 34 of the Distinguished Flying Cross, and 50 of the Bronze Star Medal. There are certainly many more which have not been reported.

Pfc. Ira H. Hayes, a full-blood Pima Indian from Bapchule, Ariz., was one of the six men who raised the flag on the summit of Mount Suribachi on Iwo Jima, as shown in the famous photograph by Joe Rosenthal. Many Indians took part in the battles on Iwo Jima and Okinawa, as the casualty lists show.

A Ute Indian, Pvt. Le Roy Hamlin, was with the first group to cross the Elbe River and make contact with the Russian Army, on April 25, 1945. Another Ute, Pfc. Harvey Natchees, wearer of the Bronze Star Medal and the Purple Heart, was the first American soldier to enter the center of Berlin.

Many Indian prisoners of war, released from German camps, have returned to the United States. Among those freed from Japanese prisons in the Philippines was Maj. Caryl Picotte, Sioux-Omaha, from Nebraska, who spent 32 months in captivity. Major Picotte served in the heroic defense of Bataan, where he was recommended for the Distinguished Service Cross and the Silver Star, and was in the "death march" to Cabanatuan prison. Lt. Col. Ernest McClish, Choctaw, who was reported missing in action at the time of the surrender on Bataan, came home after nearly 3 years as guerrilla leader in the Philippines where he helped to organize both civilian and military resistance.

During the past year Indians continued to leave the reservations for jobs in the war industries. Navajos and Hopis provided the manpower for ordnance depots in New Mexico and Arizona. Pueblo Indians traveled to Utah to work in the naval supply depot at Clearfield, returning during the summer months to farm their lands. More than 40,000 Indian men and women annually took war jobs away from their reservation homes.

Indians not only increased food production at home, but contributed to victory by working for the Red Cross and for the war loan drives. Many communities, where cash incomes are small, have made large contributions to the Red Cross, and war bond quotas have frequently been oversubscribed.

In April 1945 more than 400 Aleuts, who had been evacuated from the islands when the Japanese invaded the Aleutians in 1942, returned to their homes. They had been resettled on the mainland, near Juneau and Sitka, where, for nearly 3 years, they worked in canneries and engaged in fishing. The Army and Navy, with the help of Indian Service architects, will rebuild their war-wrecked villages; and Indian Service teachers and special assistants are helping the natives to reestablish themselves in their homeland.

Division of Territories and Island Possessions

BENJAMIN W. THORON, *Director*¹



THE territorial areas of the United States—Alaska, Hawaii, Puerto Rico and the Virgin Islands—are giving accelerated attention to their ultimate political destiny. Believing that these areas should have the opportunity to determine for themselves their political relationship with the continental United States, the Division of Territories has aided in the formulation of policies that conform to each area's aspirations.

The Division assisted in the drafting of the Statehood bill for Alaska which was introduced by Alaska's Delegate to the Congress, E. L. Bartlett. Pending the time that this may become a reality, it has begun a complete revision of the Alaska Organic Act, which has had only fragmentary revisions since 1912 and which in many of its provisions is obsolete, retaining for the Federal Government functions which the territory is well able to perform for itself. The revisions now being drafted would provide for an elected Governor, for additional taxing power in the legislature, for a complete territorial judicial system and for other reforms which would give the territory a political and economic base from which the transition to statehood would be facilitated.

Hawaii's Delegate, Joseph R. Farrington, has also introduced a statehood bill for that territory which the Division helped to draft. As in the case of Alaska, it is felt that a revised Organic Act, extending especially a greater amount of political responsibility to Hawaii, will provide a sensible and logical transition to statehood. Consequently the Division has conducted preliminary studies of the Hawaiian Organic Act, with a view to its reform.

Puerto Rico has a politically mature people who, after 45 years of waiting, also are urging a speedy determination of their political relationship with the United States. Senate bill 1407, in the drafting of which the Division participated, and which provided for an elected Governor and considerably increased local autonomy, failed of passage in the Seventy-eighth Congress. Late in the year,

¹ Resigned effective June 30, 1945, and was succeeded by Edwin G. Arnold.

the Senate Committee on Territories and Insular Affairs held hearings on Senator Tyding's independence bill and the Division arranged for Puerto Rican representatives to testify. From this came a new bill, drafted by a joint commission of the Legislature of Puerto Rico, which was introduced in the Senate by Senator Tydings (upon request) as Senate bill 1002 and by Commissioner Jesús T. Piñero of Puerto Rico in the House as House bill 3237. This bill would authorize a plebiscite so that the people of Puerto Rico could decide by democratic means whether they favor independence, statehood or a dominion type of status.

The Organic Act of the Virgin Islands has been under the practical test of actual usage only since 1936, but in that time various defects have shown themselves which make it short of ideal and the Virgin Islanders themselves have created an Organic Act Reform Committee which is busily engaged in drafting proposed amendments to the act. Among the Committee's proposals which are being carefully considered by the Division is one which would give the Islands a representative in Congress. They alone among United States citizens of territories and possessions do not now have such representation.

Knowing that governmental techniques are acquired only through actual working experience in government, the Division has recommended the appointment of qualified Virgin Islanders to positions of responsibility when vacancies occur. The posts of Executive Assistant to the Governor, Commissioner of Finance, and Superintendent of Schools for St. Croix have all been filled by local persons in the past year.

Greater political autonomy, whether it takes the form of statehood, independence or an intermediate form of status, must rest on a sound economic and social structure to be successful and the Division has aided the territorial areas toward this end.

Major attention was devoted during the year to the formulation of a program intended to implement an order from the late President Roosevelt following his speech at Bremerton on August 12, 1944. In that speech he stated:

* * * I am going to set up a study of Alaska and the Aleutian Islands as a place to which many veterans of this war, especially those who do not have strong home roots, can go to become pioneers. Alaska is a land with a very small population * * *. I am convinced that it has great opportunities to those who are willing to work and to help build up all kinds of new things in new lands * * *.

A preliminary program was immediately drafted in cooperation with the various bureaus of this Department, and with agencies of the Department of Agriculture, recommending projects in every economic field that show promise of supporting additional population

in Alaska. It included such diverse activities as a land classification program to aid homestead settlement and experimental fishing operations intended to "prove up" the undeveloped ground fishery resources. Other parts of the program included the completion of the basic topographic mapping of the Territory, mineral investigations, water resource investigations, planning for the development of the recreational resources, improvement of spawning streams to increase the runs of salmon, an increase in experimental work on the breeding and feeding of fur animals, surveys of roads necessary to postwar development, a number of projects in support of agricultural development, such as soil management and fertilizer investigations, and studies of the economic possibilities of agriculture in Alaska.

A budget for the conduct of the program was submitted to the Congress with the approval of the President, as a part of the First Supplemental Appropriation bill for 1945. This program was rejected as being too ambitious to initiate during the war period. The Division then undertook to prepare a modified study program for inclusion in the regular budget of the Department of the Interior for the 1946 fiscal year, every attempt being made to comply with suggestions made in the course of the previous hearings. However, the modified program did not prove to be acceptable and all funds for the study suggested by the President were eliminated from the appropriation bill. It is still hoped that the major parts of the program may be undertaken.

As a result of the interest stimulated by the President's speech, the volume of inquiries about postwar opportunities in Alaska from people in all parts of the Nation, particularly from men in the armed services, has increased to an average of over 600 inquiries a month. These request detailed information on such subjects as the cost of living, communication and transportation facilities, climatic conditions, business, trade, employment and prospecting opportunities, requirements to practice in professions, and methods of acquiring land in the agricultural regions of Alaska.

The Division has continued to work closely with all Federal agencies functioning in the Territory, as well as with Territorial officials and other agencies within the Department, in planning for the postwar development and settlement of the area.

A program was worked out with the War Manpower Commission under which that agency agreed to recruit civilian workers for The Alaska Railroad to replace the railroad operating battalion which the War Department had made available to the railroad in 1943. The recruitment program was sufficiently successful to permit the removal of most of the military personnel before the end of the fiscal year.

The Division, in cooperation with the Delegate in Congress from Alaska, conducted negotiations with the War Shipping Administration

to secure continuation of the wartime waiver of the coastwise navigation law, thus permitting continued service to Alaska by Canadian coastwise vessels so long as the number of American vessels continues to be inadequate to serve the requirements of the Alaska trade. These representations succeeded in securing extension of the waivers.

The Division represented The Alaska Railroad, the Alaska Road Commission and the Alaska Rural Rehabilitation Corporation in numerous contacts with other Government agencies, in discussing and solving problems of labor relations, acquisition of property, establishing priorities for obtaining equipment, and other matters requiring attention in Washington.

The House Committee on Territories secured the enactment of a resolution directing the Committee to investigate the various political and economic problems in Alaska. The Division has worked closely with the Committee in arranging for the investigating trip for the summer of 1945. A member of the Division will accompany the Committee.

After nearly three years under martial law, the Territory of Hawaii in October 1944, had restored to it by Presidential proclamation the privilege of the writ of habeas corpus. The military no longer tries civilians for offenses against Territorial law and except for certain restrictions the citizens of Hawaii have regained their peacetime status. The Division of Territories had long been working toward this end. It early believed that the public safety no longer required government under martial law and urged this view upon both War and Justice Departments.

Through the Division's effort, a number of continental companies will build plants and establish offices in Hawaii during the postwar period so as to take advantage of Hawaii's position for an expanding economic market in the Pacific area.

During the year the Civil Aeronautics Board entertained applications for certificates to operate routes between the United States and Latin America via the Caribbean area, to Asia across Alaska, and to the Orient and Australia by way of Hawaii. As the Federal agency charged with protection of interests of the territories and possessions, the Department entered an appearance as intervenor in the appropriate proceedings on behalf of Puerto Rico, Alaska, and Hawaii.

Patterned partly upon a program known as "BAWI," or "Balance agriculture with industry," which was inaugurated by the State of Mississippi, the Insular Government of Puerto Rico, through its Development Company, is engaged in sponsoring and encouraging the establishment of industries which will supplement the Island's agricultural economy and put its people to work.

Through the War Production Board the Division secured priorities for an \$890,000 clay products plant, which will utilize Puerto Rican

clays in the manufacture of structural tile, brick, sewer pipe, and other heavy glazed products, as well as dinnerware, gardenware, sanitary ware, etc. Priorities were also secured for the construction and equipping of a paperboard mill which will have a capacity of 8,000 tons of paperboard a year and which will utilize the Island's waste paper and some of the bagasse pulp from its sugar mills to manufacture containers for the bottles now being produced in the new glass plant. Continuing aid to the Insular Government in reaching capacity production in the glass plant, the Division presented the plant's case for additional equipment to the WPB. Final capacity of the plant when all units are in operation will be in the neighborhood of 57,600,000 bottles of 16-ounce weight annually. The plant is one of the most modern in the world and will employ several hundred persons directly and several hundred more indirectly.

The Division, the Insular Government of Puerto Rico, and the Government of the Virgin Islands believe that the American-Caribbean offers attractive opportunities for industrial capital from the continental United States and from the islands to establish new as well as branch plants to supply the sizable local market and the vast markets in South and Central America. Full cooperation is being given the local governments in making these opportunities known. Through these efforts a leather company with its main office in New Jersey is now running a branch plant in Puerto Rico which will soon be employing, if it is not already, more than 700 persons. The Division dealt also with a company from New Jersey which manufactures leather eyeglass cases, a silverware factory in Baltimore, perfume companies in New Jersey and Chicago, a frozen foods company which is interested in quick-freezing Puerto Rico's pineapple, a sausage casing company in Chicago, a bicycle plant in Ohio, a soft drink firm in New York, a watch company, a diamond-cutting concern from Belgium, several rug concerns in New York, a ceramics importer in Florida, an elastic products firm, furniture plants in New York and Chicago, a large citrus-fruit grower in Florida who was interested in securing fancy gift baskets for his products, and a coconut fiber plant.

When War Production Board Order M-388 was being formulated to give priority assistance to manufacturers of medium-priced wearing apparel, it became obvious that the hand needlework trade of Puerto Rico, the Island's third largest industry, would suffer a death blow and that most of the industry's 50,000 employees would be thrown out of work. Director of War Mobilization and Reconversion, Fred M. Vinson, agreed that this would be disastrous to Puerto Rico's economy and requested the WPB to make special provision for the Island. Following prolonged discussions with the WPB and with industry representatives in Washington and in New York, the Division began the allocation of fabrics totaling 17,200,000 yards annually.

So that the Insular Government of Puerto Rico might start its expanded educational and health program, this office worked with the WPB to secure priorities for health subunits and school units. Approval was secured for the latter and 250 new school units will now be made available in the Island.

Arrangements were made with the Geological Survey to assign geologists to Puerto Rico, on a reimbursable basis, to conduct a preliminary survey for oil; with the Fish and Wildlife Service to study fish resources; with the Navy Department for the release by Navy, as surplus to its needs, of the greater portion of the 21,000 acres on Vieques Island, Puerto Rico, previously acquired in condemnation proceedings for naval purposes.

The Civilian Food Reserve Unit of the Division of Territories, working with the Office of Supply of the War Food Administration, during the year procured and shipped to Puerto Rico and the Virgin Islands a total of 503,294 tons of foodstuffs and fertilizers. In accordance with the expressed policy of the Department, the Division has been for a long period returning to the regular trade channels the procurement of many of the food and feed commodities, and is completing final arrangements to discontinue all governmental procurement.

Agreements were reached with the debtors and approved by the Department in 478 hurricane relief loan cases, making a total of 1,704 loans which had been adjusted at the end of the year. Approximately 540 loans require further action. Collections for the year amounted to \$137,686.05, as compared with \$135,835.05 in the preceding year. The total sum of \$913,113.46 has been realized from collections during the years 1938-1945.

Following the policy of delegating controls to the municipalities wherever possible, the Division arranged, at the request of the municipal council, for the community to lease and operate the federally owned St. Thomas Meat Market and Cold Storage Plant in Charlotte Amalie, Virgin Islands. Meats for this plant come principally from the St. Croix abattoir, which is operated under a lease with the St. Croix Livestock Association. During the past year 794 cattle, 277 sheep and 119 hogs were slaughtered at the abattoir and sold as government inspected meats.

The net profit from general operations of The Virgin Islands Co., before income tax, totaled \$38,458.46. Approximately 45 percent of the \$515,383 of total municipal revenues in St. Croix was paid by the company. Sugarcane cultivation increased 20 percent due, principally, to the Commodity Credit Corporation support payment of approximately 90 cents per ton of cane.

The Division continued to exercise certain fiscal responsibilities in connection with the Philippines. The total of Philippine public funds on deposit in the United States on June 30, 1945, amounted to

\$481,218,704.92. During the year, payments in total amount of \$26,062,777.81 were made by the Division from funds of the Philippine Government to meet obligations of the Commonwealth.

ALASKA

The year ending June 30, 1945, marked the transfer of military activities from all Alaska to the westward half of the Aleutian Islands. The decommissioning of numerous posts on the Alaska mainland and the reduction of personnel in others together with the cessation of military construction resulted in a sharp drop in economic activity.

The territorial legislature, which met in its seventeenth biennial assembly, passed a considerable body of constructive legislation, some of which had been sought for years. It responded to the rising sentiment for greater Territorial autonomy and self-government by adopting a memorial requesting Congress to grant statehood, and by providing a referendum on statehood for the next general election. It created an Alaska Development Board to meet postwar problems following the precedent established in the 48 States and Hawaii. It replaced the inadequate part-time Commissionership of Health with a full-time Commissioner of Health responsible to a board of five appointed by the Governor and increased the appropriation for tuberculosis care. It recognized the increasing importance of agriculture in Alaska by establishing a Department of Agriculture. It prepared to meet the acute housing shortage and to take advantage of Federal legislation by establishing a Housing Authority. It met the economic problem of two groups of Territorial residents by increasing the maximum old-age allowance from \$45 to \$60 monthly and by raising the salaries of territorial employees 15 percent, thus approaching, if not quite attaining, the Federal employees' 25 percent differential.

The territorial legislature strengthened the social security program by adopting a retirement act for the territorial school teachers and by extending coverage of the Unemployment Compensation Act. It eliminated one growing obstacle to progress by passing a land registration bill designed to remove the dead hand of vanished ownership from those who had patented lands of mining claims or who had left the Territory and could not be reached. It took epoch-making steps to place the Territory abreast of contemporary thought by outlawing discrimination based on race in public establishments, and likewise abolishing discriminations long existing and sanctioned by government practice and procedure in the Territory's juvenile code and in the law relating to dependent children. The results of this legislative session were extremely gratifying on the whole, indicating an increased awareness of the Territory's needs and its important destiny in the American Union.

Development Requires Federal Aid

Alaska's needs are great because of the Territory's large area, its inadequate communications, its relatively sparse and widely scattered population, when viewed in the light of anticipated migration to the area after the war. This prospective influx is of two kinds. It consists, first, of a great number of Americans, chiefly from the armed services, who hope to carve out a livelihood along America's last frontier. Second, a large number of Americans will want to travel to Alaska for their vacations.

Unfortunately Alaska is unprepared for both groups. For the first and more important category, since they aspire to be permanent residents, it is clear that at present roads, utilities of all kinds, housing, and economic opportunities are inadequate for any considerable number.

For highway construction, for the improvement of its health facilities, for the classification of lands, for the development of agriculture, and in countless other ways, Alaska needs Federal assistance which it has never enjoyed in sufficient measure. Alaska can probably do more than it has done in raising additional revenue for self-development, but the task of caring for a prospective citizenry larger than the existing population is clearly beyond the reach of the Territory with its small number of people and undeveloped resources. The development of Alaska—the farthest North and West continental territory of the United States and of great strategic importance, to make it available for successful settlement by returning non-Alaskan soldiers, sailors and marines, Wacs, Waves and Spars—the opening up of an area one-fifth as large as the 48 States, is a Federal responsibility and requires the prompt, generous, and intelligently directed support of both the Legislative and executive branches of the Federal Government. The prospective visit to Alaska during the summer of 1945 of several congressional committees should be a happy augury of the awakening of this interest on the part of national administration.

Influx of Travelers Expected

As for the second group of Americans, the numerous tourists who may spend their vacations in Alaska, it may be stated that they will find there sensational scenic beauty and wildlife abundance. However, accommodations are lacking to care for even a small fraction of those who will desire to go. They need to be developed jointly by Federal appropriations and private capital. The Federal Government has for years set aside vast areas as national parks and monuments in Alaska, withdrawing them thereby from other use, and as yet has made no appropriations for their development as it has for the national parks and monuments in the 48 States. Federal support is further warranted since the Alaskan economy hitherto has been

based almost entirely on industries—gold mining and salmon fisheries—and the tourist industry is clearly indicated as the single most important potential economic development. If the Federal Government does its part, private capital, both from outside Alaska, and within their means from Alaskans, may be expected to do its share in developing tourist business. Highway construction through Federal funds, of which the Territory has never had its fair share, essential also in this connection, is an excellent concomitant to every form of Alaskan development.

Alaska Road Commission

The Alaska Road Commission, which is responsible for the construction and maintenance of all roads and trails throughout the Territory except for roads in the national forests which are handled by the Public Roads Administration, carried out during the year the maximum reconstruction and maintenance program permitted by the funds available. No new highways were built. However, it reconstructed and maintained 2,700 miles of highways, 1,250 miles of sled roads and 4,000 miles of trails.

As the year ended, in conjunction with the Division it was working on a new program for road construction to be requested in its 1947 budget. Additional road construction is vital for some areas of the Territory to make additional lands accessible and to open markets. With prospective increased population, better transportation and communication must be made available.

Funds for the commission's program come from six sources: direct annual appropriations by Congress; reappropriation by Congress of a portion of the Alaska Fund, which is derived from Federal taxes upon the Territory's industries; appropriations by the territorial legislature; moneys allotted by the National Park Service; contributions by individuals, companies and corporations; and transfers from the War Department to cover cost of maintenance work on the Alaska highway.

Of these sources, the most important is direct appropriations by Congress and these must be augmented to make any extension of the program possible.

The Alaska Rural Rehabilitation Corporation

The fiscal year 1945 was a very successful one for the Matanuska Valley Farm Colony. Improvement in the methods of crop selection and marketing facilities is brought about as the farmers become better acquainted with Alaskan conditions. Gross business by the Matanuska Valley Farmers Cooperating Association in 1944 amounted to \$1,235,016.92 as compared to \$1,017,426 in 1943. Farm products sold through the cooperative increased from \$370,000 in 1943 to \$437,000 in 1944.

With revitalized interest on the part of the farmers and new personnel in the management of the Alaska Rural Rehabilitation Corporation and the Matanuska Valley Farmers Cooperating Association, the colony should continue to make consistent and satisfactory progress.

The Alaska Railroad

The Alaska Railroad's record of freight and passenger traffic in the fiscal year 1945 no longer recounts steeply rising volume. Rather, the changed war situation in Alaska has caused a reduction of military traffic in practically all areas served by the railroad. Net ton-miles of revenue freight carried were 21.5 percent less than the volume in 1944; however, the ton-miles were more than three and one-half times those in 1939, the last year before war activities affected rail traffic.

Gross operating revenues for 1945 were \$8,603,546.36 as compared with \$11,289,637.46 in 1944, a reduction of \$2,686,091.10, or 23.7 percent. The net income amounted to \$1,936,840.79 as compared with \$5,242,924.45 in 1944, a reduction of \$3,306,083.66, or 63 percent.

The total revenue freight hauled decreased from 627,847 tons in 1944 to 549,248 tons in 1945, a reduction of 78,599 tons, or 12.5 percent. Included in this year's tonnage were 225,887 tons of coal compared with 229,961 tons last year.

The total number of passengers carried was 88,998, an increase of 4,698, or 5.5 percent. Passenger-miles totaled 9,275,913, which was a reduction of 1,605,119 passenger-miles, or 14.7 percent under 1944.

Four river steamers were operated during the season of navigation on the Tanana and Yukon Rivers furnishing service between Nenana and Marshall. Tonnage handled amounted to 17,365 tons, an increase of 12 percent over the preceding year. The Nenana marine ways were enlarged to accommodate all of the floating equipment. A fuel-oil storage tank was installed at Nenana and a barge was converted into a fuel-supply barge.

HAWAII

The cost of the war to Hawaii in terms of expended resources, natural and human, recurring and nonrecurring, is literally incalculable. Its civilian population, swollen during 3½ years of war to a figure in excess of one-half million, cheerfully shared with uncounted thousands of service men and women accommodations and facilities for human subsistence which in other times would have been considered intolerable.

While the general health picture throughout the Territory improved during the year, work strain and congested living conditions undoubtedly contributed to the increased high death rate from tuberculosis. Marked progress on the Federal housing program during the latter part of the year promised to ease this situation.

Military Rule Ends

Although Hawaii's citizens, since the outbreak of war, had accepted with restraint and understanding a period of military rule unique in the history of the Nation, there was general satisfaction at the action of the late President in October 1944 by which the writ of habeas corpus was definitely restored, military authority over civilian activities was further limited, and the trial of civilians in military provost courts was discontinued. However, at the year's end, the 10 o'clock curfew was still in force and civilian mail continued to be subjected to military censorship.

In the Seventh War Loan drive, Hawaii again exceeded its quotas, leading the Nation in per capita sales.

Wartime Dislocations Acute

Increasingly acute adult manpower shortages, estimated at 15,000 for the island of Oahu alone, and nonavailability of heavy machinery for the extension of mechanization continued to handicap the production of sugar and pineapples. Since the start of the war, sugarcane land in cultivation declined almost 30,000 acres, or about 12 percent. About one-fourth of these lands was taken for Army and Navy purposes and the remainder was abandoned because of wartime production difficulties. However, the diligence of the producers and the strenuous efforts of Hawaii's school children combined to keep the percentage of decline in production at a low figure compared with the percentage of loss of lands and labor.

Hawaii's fishing industry was virtually eliminated by the war, although, during the latter part of the fiscal year, the efforts of the Territorial Board of Agriculture and Forestry to reestablish the industry were beginning to show results and it appeared that substantially increased quantities of fresh fish would soon be available to Hawaii's people.

Territorial tax realizations, internal revenue collections, gross postal receipts and bank clearings for the year reached an all-time high, although the increase in nontaxable Federal land holdings and continued declines in revenues from gasoline and motor-vehicle taxes were the cause of concern to the county governments which depend for support on these sources of revenue.

Labor and material shortages combined to delay progress on a number of projects vital to the territorial welfare but the past year saw the completion of a 100-bed addition to Queen's Hospital and a water development project, both of which were partially financed with Lanham Act funds.

Little Wagner Act

The regular biennial territorial and county elections which were conducted last year showed the largest vote in the Territory's history, indicating Hawaii's continuing interest in the processes of free democracy.

Hawaii's second wartime legislative session resulted in appropriations exceeding anticipated revenues by some \$19,000,000, indicating the probable necessity for extensive postwar readjustment of Hawaii's fiscal affairs. Much progressive legislation was enacted and approved by the Governor, including requirements for premarital physical examinations and vaccination and immunization against certain diseases, a "little Wagner Act" sponsored by labor, acts strengthening and broadening the scope of the child labor and workmen's compensation laws, acts increasing benefits under the unemployment compensation laws and establishing higher minimum wages throughout the Territory. A veterans' council was established and given a generous appropriation and provisions were made for substantial expansion of the facilities of the University of Hawaii and for improvement of the pupil-teacher ratio in the public schools. An airport zoning law was enacted and a commission was created to study the feasibility of establishing a territorial system of health insurance.

PUERTO RICO

Heading a list of legislative measures acted upon by the sixteenth Legislature at its first regular session, was Joint Resolution No. 1 requesting Congress to define the forms of political status "That Congress may be disposed to grant upon approval of any of them by the people of Puerto Rico." This resolution led to the Tydings-Piñero bill, introduced in Congress in May, which provides for a plebiscite on three forms of political status—*independence, statehood, and dominion.*

The Governor approved 328 bills passed by the legislature. Major appropriations included \$17,500,000 for the Development Company, \$15,000,000 for the Development Bank, and a total of \$11,232,000 for the Insular Emergency Council (principally for the relief program).

New agencies created included: (1) the Puerto Rico Agricultural Company to encourage the maximum development of the agricultural resources of Puerto Rico; (2) the Coffee Insurance Corporation of Puerto Rico in the Department of Agriculture and Commerce; (3) the Aqueduct and Sewer Service to handle all public aqueducts and sewers in Puerto Rico; (4) the Puerto Rico Labor Relations Board; (5) the Office of Information for Puerto Rico; and (6) an Office of Puerto in Washington.

Estimated total receipts from all sources for the fiscal year were 17 percent less than the previous year. The decrease from the total

receipts for the previous year was accounted for primarily by a sharp decline in rum exports which cut United States internal revenue collections returned to Puerto Rico.

Strike Delays Sugar Harvest

The sugar harvest was delayed over a month by an industry-wide strike early in the season. Nevertheless the sugar crop for the year ending June 30, 1945, was 886,100 tons, compared with 723,611 tons for the previous year. The grinding season is being extended through August by which time production for the crop year will probably total 960,000 tons. There was also an increase in the tobacco crop, from 285,000 quintals the previous year to a total of 400,000 for the current fiscal year.

The strike in the sugar industry, which lasted 36 days and involved 140,000 workers, was the most serious labor dispute of the year. It was adjusted when the Commodity Credit Corporation raised the sugar subsidy thus permitting employers to increase the wages of agricultural workers as well as those of mill workers.

The mediation and conciliation service of the insular department of labor disposed of 206 situations involving 353,510 workers, of which 54 ended in strikes involving 140,230 workers.

Birth Rate Increases

The war emergency program has carried on two major types of work relief projects: construction, employing an average of 23,812 persons; and community service, employing 7,800.

The increase in enrollment in all Puerto Rican schools, during the school year, was 25,777, or 7.82 percent. Total enrollment was 335,179. The university had 4,250 regular students enrolled.

The death rate showed a slight increase, from 14.7 per 1,000 to 14.8, while the birth rate rose from 39.6 to 41 per 1,000.

During 1944 the public welfare division provided financial assistance to 27,797 persons.

Civil Service Strengthened

The Civil Service Commission conducted a survey of the status of classified insular government employees and of personnel practices. Twelve thousand positions were described in job analysis sheets, duties and responsibilities analyzed, and the positions allocated to the classes established. A compensation plan was drafted which was enacted into law by the legislature and the salaries for all positions were fixed in accordance with the provisions of the compensation plan.

Industrialization Progresses

The Development Company's glass container plant began operations in January 1945, though work was temporarily interrupted by

a strike which occurred shortly thereafter. Substantial progress was made on other projects of the Development Company. A mill for the manufacture of pulp and paperboard was nearly completed. Contracts were approved covering machinery and engineering services to build a wallboard plant and a clay products plant. Pilot plants were established in textile design, basketry, furniture, and handiwork novelties. Studies were made of possibilities of establishing a cotton weaving and finishing plant, a shoe industry, and a meat-packing plant.

War's Impact Heavy

The war toll in Puerto Rico in terms of an upset economy and increased human suffering was demonstrably large, especially in the 18 months following Pearl Harbor. The curtailment of shipping in 1942-43 brought the island to the verge of collapse. The extent to which the process of strangulation progressed is illustrated by the fact that civilian tonnage reaching the island fell from a normal 100,000 tons in January 1942 to a little over 7,000 tons in September 1942.

Fortunately, September 1942 turned out to be the low point. In the following months shipping to the island was gradually increased until, by the late spring of 1943, it could be said definitely that the crisis had passed.

The shipping shortage had drastic, immediate, and long-term effects. Of the three principal food items—rice, beans, and codfish—codfish was unobtainable for a considerable period, supplies of rice were exhausted for several months, and beans, throughout, were very scarce.

On the industrial side, the disruption of shipping had an immediate and serious effect. Lacking space to bring bottles down and send bottled rum back, the rum industry faced complete stoppage for the duration. This was averted by the use of small boats. The volume of needlework fell off from a value of \$10,646,000 in 1941 to \$8,579,000 in 1943. Irregularity of schedules, as well as lack of space, caused continental operators to send their materials elsewhere for processing.

The long term effects of the shipping shortages were felt in agriculture—principally in sugar and tobacco. Both of these crops require large amounts of fertilizer, practically all of which is imported. Scarcity of fertilizer materials and lack of shipping space reduced fertilizer imports and the results in decreased sugar production came in succeeding years after the shipping problem had been solved.

The war brought a rapid increase in unemployment. With the liquidation of the Work Projects Administration in December 1943 the insular government was forced to assume responsibility for direct and work relief. Since then more than \$50,000,000 of insular money has been appropriated for this purpose.

THE VIRGIN ISLANDS

World War II demonstrated that the price which the United States paid for the Virgin Islands is more than adequately compensated by their strategic value in the defense arch protecting the Caribbean Sea approaches to the Panama Canal.

This year, as the war moved swiftly toward the end, Virgin Islanders turned their thoughts to the cushioning of their economy. Some of the effects of the temporarily disrupted harbor activities in St. Thomas were offset during the past 2 years by the suddenly expanded activities of the rum industry. Recently the harbor of Charlotte Amalie has begun to show signs of a recurrence of its once healthy activity as neutral ships again are permitted to call here for bunkering.

Transportation to the islands was improved when a Puerto Rican airline, servicing the Virgin Islands and Puerto Rico, leased the new, modern, and fast air equipment of one of the large national airlines, and when an American airline recently extended daily air service from the mainland to St. Thomas.

St. Croix this year produced 4,040 tons of raw sugar while 3,200 tons of cane were processed for rum. The Virgin Islands Co., operating St. Croix's only sugar mill and one of its two distilleries, continues to be the substance as well as the nucleus of the island's economic life.

Islands Look to Public Works

The postwar program for the Virgin Islands has centered around the projected construction by the Federal Works Agency of public works, health and sanitation facilities for which Congress, by Public Law 510; approved December 20, 1944, authorized appropriations totaling 10 million dollars. An initial appropriation was made for plans and specifications and it is hoped that an appropriation of the first 2 million dollars will be made within the next few months, permitting construction to begin early in 1946.

Birth Rate Highest On Record

This year the general health of the islands has been good and epidemics have been scarce. The birth rate for the calendar year 1944 was 43.4, the highest on record; the death rate was 16.3, a slight increase over the preceding year, but still lower than in any previous recorded year, and the infant mortality rate was 101.2, higher than in the preceding year.

Finances and Services Improved

The economic and financial trends indicate an inevitable decline from the prosperity in both islands in the fiscal year under review. The revenues of the municipality of St. Thomas and St. John were

\$1,257,416.53, a decrease of 22.27 percent. In St. Croix, the revenues were \$515,383.28, an increase of 96.20 percent over the preceding year, the largest revenue in its history, due directly to the rum profits of the Virgin Islands Co. As a result, long-neglected municipal services were improved. Prospects of revenues, for the coming fiscal year, however, are not bright in St. Thomas and St. John, and St. Croix faces an acute situation.

The department of social welfare in St. Croix distributed minimum monthly grants of \$2.50 to more than 400 indigents. These grants were once as low as \$1. In St. Thomas comparable grants of \$5 were made to a like number of indigents. There was considerable improvement in the social services, especially in child-welfare work. Unemployment in both islands was relieved in great measure by local public works appropriations.

By June 30, 1945, there were 688 inductees from the Virgin Islands in the armed forces. In most instances, their military pay plus allowances to dependents exceeded previous family incomes.

Increased Self-Government Recommended

A definite policy on political status should be developed for the islands. Every effort must be concentrated on helping the islanders develop the governmental techniques which will enable them to assume increasing responsibility in the management of their local affairs and in helping them increase their economic self-sufficiency. In addition to the Department of the Interior's policy of employing qualified local persons whenever they are available for Federal positions in the islands, certain features of the Organic Act should be amended. Suggestions for such amendments are now being drafted by a local committee.

THE PHILIPPINE ISLANDS

Following the American landings in the Philippines, the highest officials of the Japanese-sponsored puppet government were transferred from Manila to Baguio. Most of these men were captured and are now held in the custody of the United States Army pending trial after the war by the Commonwealth Government on charges of collaboration with the enemy. Three of these officials escaped in Japanese planes to Tokyo—José P. Laurel, the so-called President of the puppet Republic; Camilo Osias, Secretary of Education and ex officio President of the Kalibapi (the Japanese sponsored Fascist Party), and Benigno S. Aquino, Director-General of the Kalibapi and Speaker of the puppet National Assembly. Manuel A. Roxas, recently chosen President of the Commonwealth Senate, who had also been transferred to Baguio, was released from custody by the military authorities as an unwilling office holder whose loyalty to

the Philippines and to the United States had been thoroughly established.

While the great mass of Filipinos have heroically resisted the Japanese during the occupation, it is a matter of concern to the United States that those individuals who have taken leading parts in the puppet regime are for the most part men who were formerly high in the councils of the prewar Philippine Government. On this subject the late President Roosevelt stated on June 29, 1944, that "those who have collaborated with the enemy must be removed from authority and influence over the political and economic life of the country."

After the recapture of Manila in February 1945, General MacArthur formally restored to the Commonwealth Government "full powers and responsibility." Immediately President Sergio Osmeña set about reestablishing the executive and administrative functioning of the national government. He did not call into session the legislative branch, which was involved in an extraordinary situation, until June 9, 1945, after his return from an urgent trip to the United States.

The possible political implications of the status of the present Philippine Legislature are obvious and, in the light of President Roosevelt's statement, of deep concern to the United States. On June 9, 1945, when the special session convened, only 13 were available in the entire Senate; and of the 24 original members, all but 17 are known to have been connected in some capacity with the puppet regimes. If conditions in the Philippines, however, are stable enough to hold the election planned for November 1945, the Filipino people will have an opportunity to choose a legislature to its liking with the possible exception of the third of the Senate allocated 6-year terms.

Occupation Leaves Problems

In view of the imminence of independence and the economic and financial bankruptcy of the Philippines, the United States Government is deeply involved in the future welfare of the Islands. American reoccupation has found the sugar industry paralyzed, many mills destroyed or damaged, hardly more standing cane in the fields than should be saved for seed, and with less than half of the necessary work animals surviving. Members of the industry estimate that before the war sugar supported, directly or indirectly, about 4 million of the Islands' 17 to 18 million population. Reconstruction of this industry is largely dependent on American decisions as to future trade preferences and war damage compensation.

The Japanese occupation has saddled the Commonwealth with a mass of currency problems. The Japanese had put into circulation some 40,000,000 pesos (\$20,000,000) in Philippine bank notes previously redeemed by the Commonwealth, which they found in the

vaults of the treasury, and against which there is no reserve. An unknown quantity of treasury warrants had been issued in the name of the Commonwealth by the puppet government. After the fall of Manila, President Quezon had authorized branches of the Philippine National Bank in areas not yet occupied to issue emergency notes and Emergency Currency Boards had been empowered to issue local currencies up to the amounts of unencumbered provincial balances in the bank. As the occupation period stretched out and the need of funds grew, various units of the resistance forces issued scrip under their own civil affairs administrations. There are unknown quantities of the old prewar peso still in circulation and, added to these various currencies for which the Commonwealth has more or less responsibility, the American armed forces brought with them the new victory peso with which it pays United States troops, Filipino labor, etc.

The end of the occupation period also found the Islands flooded with Japanese pesos and suffering violent inflation. Although these notes were declared null and void upon the return of Commonwealth authority, the great increase in other currencies remaining in circulation—augmented by heavy expenditures of American forces—has combined with the dire scarcity of food, clothing, and the essentials of daily living to sustain inflation and a widespread black market.

The foregoing are illustrations of but a few of the many critical problems with which the Filipino and American people are faced as a result of the war. Statesmanship of a high order on both sides will be required to solve them.

THE EQUATORIAL ISLANDS

Although war in the Pacific terminated the Division's field development project on the islands of Baker, Howland, and Jarvis in the equatorial group, the use to which the islands were put by the United States armed services proved conclusively the value of such pioneering work. Early in the war the air strip which had been built on the island of Howland for a possible emergency landing by Amelia Earhart was destroyed by the Japanese. The Army moved into Baker in force in 1943 and constructed a Marston Mat air strip. The installations on Jarvis were rendered useless by a United States destroyer in order to prevent their possible utilization by Japanese forces.

The islands of Canton and Enderbury, which the United States holds in condominium with Great Britain, also played an important part in the war. At Canton the air facilities were greatly expanded and the island will undoubtedly remain an important link in trans-Pacific air routes.

Puerto Rico Reconstruction Administration

BENJAMIN W. THORON, *Administrator*¹



THE Puerto Rico Reconstruction Administration was established by Executive Order No. 7057 of May 28, 1935, to "initiate, formulate, administer, and supervise a program of approved projects for providing relief and work relief and for increasing employment within Puerto Rico." President Roosevelt emphasized that the main objective of the program should be permanent reconstruction of the island's economy in terms of agricultural rehabilitation, rather than mere temporary palliative relief. For this purpose funds aggregating approximately \$70,000,000 were made available to the Puerto Rico Reconstruction Administration by allotments from appropriations contained in the Emergency Relief Appropriation Act of 1935 and later relief acts, and by direct appropriations for the Puerto Rico Reconstruction Administration through the fiscal year 1941. Thereafter financing has been exclusively through funds allotted by the President out of the Puerto Rico revolving fund. That fund created by the act of February 11, 1936, consists of income and the proceeds of the disposition of property derived entirely from the Puerto Rico Reconstruction Administration's operation of projects which were financed with funds originating in the Emergency Relief Appropriation Act of 1935. The advent of the Work Projects Administration in the island, large expenditures for defense and war activities, and assumption by the insular government of much of the responsibility for the employment relief had removed the necessity for large expenditures by the Puerto Rico Reconstruction Administration which existed when it was the only agency equipped to alleviate the ever present unemployment problem. Accordingly the comparatively small amounts which have been available to the Puerto Rico Reconstruction Administration each year since 1942 out of the revolving fund have necessarily limited the Puerto Rico Reconstruction Administration's activities principally to protection of investments previously made, and to conservation of the most essential features of its former broad program of rural rehabilitation.

¹ Resigned effective June 30, 1945, and was succeeded by Edwin G. Arnold.

Expenditures during the fiscal year 1945 out of the Puerto Rico revolving fund were authorized by the President for the following projects:

Operation and maintenance of housing projects.....	\$225, 000
Management of lands and leases connected with the Lafayette project.....	68, 000
Operation of Castaner farm project.....	56, 500
Supervision of and making and servicing of loans to co-operatives.....	97, 000
General administration.....	160, 000
Construction of rural houses, etc.....	400, 000
Operation of Central Service Farms.....	150, 000
Subdivision and sale of lands in Lafayette district for food crop production.....	13, 000
Purchase of 5 small parcels of land in San Sebastian.....	324
Storm-water sewer and drainage at the Eleanor Roosevelt development.....	20, 500
Total.....	1,190,324

A summary of the year's principal activities, differing little in essential features from those of the preceding 3 years, follows:

HOUSING MANAGEMENT

Rental collections amounted in round figures to \$343,000 as against the outlays authorized for management and maintenance of \$225,000. This income came from the Puerto Rico Reconstruction Administration's 1,210 urban family dwelling units, nominal rentals from 4,610 rural parcels of about 3 acres each on which no houses have been built, 6,254 rural houses built in previous years, and 235 additional rural houses constructed during the year. Transportation and shipping difficulties in procuring some needed materials prevented completion of all of the houses planned, but the 235 constructed added 700 acres of formerly unproductive land to the raising of subsistence crops by resettled farm laborers as a supplement to their meagre work earnings. All of the urban houses and 98.6 percent of the rural homesteads were occupied as of June 30, 1945. Under the policy of encouraging tenants to become owners, 312 occupancy agreements in the urban zone and 4,526 in the rural districts had been converted by June 30, 1945, into long term purchase agreements. Final conveyances of 40 parcels without houses and of 5 rural homesteads were executed.

RURAL REHABILITATION

Like the 6,489 rural houses and their adjacent parcels devoted to the cultivation of minor food crops, the Central Service Farms project is a most important part of the Puerto Rico Reconstruction Administration's continuing rural rehabilitation program. The insular government through its war emergency program added \$42,132.86 to the

\$150,000 in Federal funds provided for this project. This made it possible to increase the food supply and the income of the island by the planting of approximately 16,000 acres in subsistence crops and 3,500 acres in cash crops on lands of the Federal Government occupied by the Puerto Rico Reconstruction Administration resettlers. Agronomists gave the resettlers constant advice and supervision in the cultivation, harvesting and marketing of these crops. Seeds produced on 322 acres of beds in the seven Central Service Farms and fertilizers and insecticides were distributed to needy resettlers. These resettlers were not paid for labor on their own parcels, but were paid for work performed in cultivation of the Central Service Farms proper, for the repair and maintenance of intra-farm roads, and for labor in operating and maintaining the Puerto Rico Reconstruction Administration's 37 rural waterworks systems which supply potable water gratis to rural dwellers.

The Castaner project, undertaken several years ago to demonstrate that a large coffee plantation can be made self-sustaining by proper land utilization, soil conservation and crop diversification produced \$56,750.94 from the sale of citron, vanilla, coffee, sugarcane, and various minor crops, while furnishing employment to members of more than 200 rural families resettled on one- and two-acre subsistence parcels. In addition to the two 30-bed rural hospitals mentioned in last year's report as established at the Puerto Rico Reconstruction Administration's Castaner and La Plata projects by the National Service Board for Religious Objectors, health units have been opened and are being operated to serve the residents of the Puerto Rico Reconstruction Administration's rural rehabilitation projects in the Zaldondo, San Just, and Comerio areas. Under technical supervision of the planning and direction of the work program by the Puerto Rico Reconstruction Administration as authorized by the Director of Selective Service, these adjuncts of the civilian public service camps are providing invaluable health service to thousands of Puerto Rican rural dwellers for whom such facilities were never before available.

COOPERATIVES

Special attention was given to the cooperatives financed by the Puerto Rico Reconstruction Administration which are engaged in the marketing of produce and the production of commodities for war needs. The Lafayette Sugar Mill Cooperative processed 207,000 tons of cane as compared with 179,000 tons the previous year, and sold all sugar produced to the Commodity Credit Corporation. In its subsidiary solvents plant over 5,000,000 pounds of butyl alcohol and acetone under War Production Board allocations was sold for lend-lease and other war requirements. Interest due June 30, 1945, on the Puerto Rico Reconstruction Administration loan of approximately

\$3,037,450 was paid in advance, and shortly after the end of the fiscal year the cooperative paid \$250,000 on principal, although no amortization installments are due until June 1947. However, due to the termination of lend-lease and the uncertain postwar commercial demand for the plant's butyl alcohol and acetone, their production has been stopped and plans for conversion of the plant to the manufacture of industrial alcohol are under consideration. The Los Canos Sugar Mill Cooperative processed approximately 200,000 tons of cane, paid interest accrued and \$54,000 of its principal debt to the Puerto Rico Reconstruction Administration under a refinancing arrangement, with the balance of \$936,000 payable in annual amortization installments of approximately \$50,000 including interest beginning June 30, 1946. Five vegetable-marketing cooperatives previously organized and financed by Puerto Rico Reconstruction Administration increased their volume of business to approximately \$500,000 from \$300,000 for the fiscal year 1944 and \$100,000 for the fiscal year 1943. All met installment obligations to the Puerto Rico Reconstruction Administration on time and one paid 4 years in advance. Two additional vegetable marketing cooperatives, one at Corozal and the other at Barranquitas were organized and financed with Puerto Rico Reconstruction Administration loans totaling \$29,000. The Cotton Growers Cooperative Association, to which at one time loans aggregating \$125,000 had been made, reduced its existing \$63,750 loan to \$30,000, having sold 1,756,466 pounds of Sea Island cotton during the fiscal year. The Sociedad Agricola which purchases farm supplies for members and patrons, sold approximately \$762,000 of fertilizer, feeds, etc. An additional loan of \$20,000 was made to the Puerto Rico Rug Cooperative, composed of rural dwellers, and which had a record volume of business amounting to over \$122,000. The cooperative organized and financed the previous year and known as the "Cooperativa de Cosecheros de Cidra", processed approximately 1,100,000 pounds of citron during the fiscal year, representing about one-fourth of the island's total production of a product for which previously there was little encouragement. The accounting and operations of all of these cooperatives sponsored and financed by the Puerto Rico Reconstruction Administration are under its constant supervision.

CONCLUSION

For the continuation during the fiscal year 1946 of projects similar to those above reported, the President has authorized the Puerto Rico Reconstruction Administration to expend approximately \$950,000 out of the Puerto Rico revolving fund. On June 30, 1945, the unobligated balance in this fund was approximately \$2,650,000. Anticipated deposits to the revolving fund during the fiscal year

1946 and succeeding years in proceeds derived from projects financed with what were originally 1935 funds, will be somewhat less than the amounts required each year to continue the Puerto Rico Reconstruction Administration's present limited program. Accordingly in a few years the revolving fund will be so depleted that some other source must be found for conserving the social and economic benefits which would be lost if the program were entirely terminated. It is unquestionably true that large expenditures either of insular or Federal funds must be made for many years to come if the permanent reconstruction of the island's distressed economy which President Roosevelt set as a fundamental objective is to be accomplished.

War Relocation Authority

DILLON S. MYER, *Director*



THE most important turning point in the comparatively short history of the War Relocation Authority program came toward the end of 1944. On December 17 the War Department announced the revocation of the mass exclusion orders under which it had evacuated all persons of Japanese descent from the West coast area in 1942 and through which it had prohibited their return to that area (except under special military permit) for almost 3 years. Basing its action primarily on the satisfactory progress of the war in the Pacific, the War Department immediately replaced the wholesale exclusion with a greatly modified system of control under which it continued to exclude only those individuals of Japanese descent whose personal records appeared to warrant such restriction. The revocation, designated to take effect on January 2, ended the wartime ejection of the great majority of West coast Japanese from their former homes and marked the beginning of the end of the War Relocation Authority program.

The War Relocation Authority which had been maintaining relocation centers as temporary shelters for the evacuated people and meanwhile helping as many as possible to become reestablished in normal communities outside the western exclusion zone, immediately took steps to realign its basic operations. First, it broadened the scope of its resettlement activities to take in the former evacuated area and thus cover the entire United States. Second, it made plans to speed relocation movement from the centers in order to close all centers except Tule Lake within 6 to 12 months. Third, it abandoned all processing of evacuee records for leave clearance and abolished its leave regulations, with the result that all center residents, except those specifically designated for detention by the War Department or the Department of Justice, were free to leave the centers at any time.

With these changes, the Authority was ready for the first time to move definitely toward ultimate liquidation of all its operations. When the revocation order took effect on January 2, there were slightly over 80,000 persons of Japanese descent still residing in the

9 War Relocation Authority centers, including the Tule Lake Segregation Center of northern California. Over 35,000—or nearly one-third of the total group that had come under War Relocation Authority's custodianship—had left the centers over a period of more than 2 years to take up residence in cities and towns all the way from Spokane, Wash. to Boston, Mass. Of the 80,000 who still remained, the War Relocation Authority calculated that approximately 20,000, consisting mainly of Tule Lake residents, would be either personally designated for detention by the War and Justice Departments or members of the detainees' immediate families. This left a total of 60,000 who had to be assisted in making the transition back to private life before the end of December 1945. Thus the War Relocation Authority was faced on January 2 with the task of completing in 1 year almost twice the volume of relocation which it had managed over the preceding 2-year period.

Several factors, however, tended to reduce the magnitude and complexity of the job. Aside from the skill which War Relocation Authority personnel had gradually gained in relocation after 2 years of intensive experience, there was the overwhelming fact of the Army's revocation order. No longer was it necessary for the average center resident to choose between remaining in the restrictive environment of a center and striking out into an unfamiliar section of the country; the great majority were now free, if they wished, to return to their former homes. Moreover, public acceptance for people of Japanese descent through the country was probably at an all-time high. The remarkable exploits of Japanese American soldiers in every major theater of war—and particularly on the Italian front—had effectively exploded the old cliché that no persons of Japanese ancestry can possibly be loyal to the United States. The excellent work record and exemplary civic behavior of nearly all resettlers from the centers had served further to dispel previous fears and antagonisms. With employment opportunities still running high and with citizen groups (as well as previous resettlers) working to help relocation in almost every major city of the Nation, the stage was set for a record movement out of War Relocation Authority centers and completion of the assignment within the scheduled time.

In order to prepare for a greatly enlarged volume of relocation and a rapidly dwindling center population, the War Relocation Authority on the day after the revocation announcement revised somewhat drastically its whole program of center operations. All activities except those which were absolutely essential and those which contributed toward relocation were scheduled for termination at the earliest feasible date. Construction was brought virtually to a standstill and even maintenance work was sharply curtailed. Crop production on the agricultural lands of the centers was eliminated

entirely except for completion of the winter vegetable program at the two centers in Arizona. All further purchase of livestock was halted and plans were made for full utilization of existing flocks and herds. Announcement was made that center schools would close permanently in June at the end of the academic year. Cooperative business enterprises, operated by the evacuee residents, were advised to start planning at once for eventual liquidation. By the end of June practically all of these changes had either been achieved or were well on the way to realization.

In submitting budget estimates to the Bureau of the Budget and the Congress shortly after announcement of the West coast revocation, the War Relocation Authority forecast that 16,000 of the 60,000 "relocatable" persons who could be relocated and who were residing in centers on January 2 would leave before the end of June. The actual number who relocated during that period was 15,907. Of this number, 4,922 returned to the evacuated zone while the remainder—many of them dependent family members following their previously relocated breadwinners—chose to resettle in other parts of the Nation. When the fiscal year ended, the total number of relocations for the preceding 12 months stood at 24,679 and the cumulative total covering the entire period since establishment of the War Relocation Authority program was 51,412. Of the 44,000 "relocatables" still residing in centers, it was anticipated that fully half would ultimately return to their communities of prewar residence in the far Western States.

RESETTLEMENT ACTIVITIES

Field Organization

One of the first steps which the War Relocation Authority took after revocation of the exclusion orders was to set up a field organization in the West Coast States similar to that which had previously been functioning throughout the rest of the country. Dividing the coastal region into three broad areas—northern California, southern California, and the northwest—the Authority established its principal field offices at San Francisco, Los Angeles, and Seattle. District offices, to handle relocation problems at the local level, were also created in these three cities as well as in 15 others such as Fresno, Santa Barbara, Sacramento, and Portland. Meanwhile the activities of field offices in several other sections of the country were slightly curtailed and four of these offices were discontinued.

Public Acceptance

Except in some parts of the Pacific coastal area, public acceptance of relocating evacuees was not a major problem of the War Relocation Authority during the fiscal year. Of the nearly 20,000 evacuees

who left relocation centers for destinations outside the former exclusion zone, less than a dozen reported any serious difficulties of community adjustment, and all of these cases were eventually worked out satisfactorily.

In many communities of California, Washington, and Oregon, however, hostility toward the evacuated people and opposition to their return assumed serious and rather widespread proportions. This was particularly true in the interior agricultural valleys of all three States and in some rural sections along the California coast; acceptance in the major coastal cities, aside from some attempts at boycott of evacuee crops in the produce markets, was generally good throughout the entire period.

After revocation of the exclusion ban, antievacuee feelings, which had been simmering throughout the fall, suddenly erupted simultaneously at several places in the coastal States. At first they took the comparatively harmless (but nonetheless reprehensible) form of hostile "mass" meetings, resolutions adopted by various organizations opposing return "at least until after the war," discriminatory signs posted in shop windows, formation of new citizens' leagues specifically for the purpose of working against return, and unfriendly editorials or paid advertisements in the local newspapers.

In the Northwestern States resistance to the return of the evacuees was very largely confined throughout the whole period to these and similar "within the law" types of discrimination. But in several of the California localities, as the evacuee continued to come back in increasing numbers despite such menacing gestures, the hoodlum element among the opposition began resorting to attempted violence and open intimidation.

By the end of June 34 such incidents—involving attempted arson or dynamiting, shots fired into the homes of returned Japanese, and threats of bodily harm—were recorded. The worst spots were Merced and Fresno Counties, with seven shootings each; Orange County, which had six cases of intimidation; and Placer County, which had an attempted arson and dynamiting coupled with a shooting. Fortunately, no evacuee was actually injured in these lawless forays. Property damage, however, was considerable, and the terrorism which prevailed over wide areas of California undoubtedly contributed to the relatively slow rate of return to that State during the first 6 months after revocation of exclusion.

To counteract unreasoning prejudices against all persons of Japanese descent and correct the factual distortions about War Relocation Authority activities which had been disseminated by hostile West coast organizations and newspapers, the Authority undertook a positive program of public information in the far western area several months before revocation of exclusion. Working mainly through and

in cooperation with civic clubs, church groups, and similar organizations, War Relocation Authority field officers tried to reach as many people as possible with factual information about the agency's aims and procedures, the status and experiences of the evacuated people since evacuation, and especially the combat record of Japanese American soldiers. Pamphlets and bulletins, setting forth such information, were made available to groups and individuals upon request; explanatory talks were given before dozens of local forums and organizational meetings; motion pictures, dealing with the relocation program, and the Japanese American soldier, were shown; progress reports and other types of information were released to the press.

In this effort, information about American servicemen of Japanese descent proved particularly effective. The almost unparalleled combat record of the all-Nisei One-hundredth Infantry Battalion and Four Hundred Forty-second Regimental Combat Team, the long list of Nisei casualties, and the impressive array of their battle decorations brought home more forcibly than anything else the fact that Japanese Americans are capable of the highest kind of loyalty to the United States and that the families in relocation centers have sacrificed equally with other American families in the winning of the war.

When the pattern of terrorism in California became plainly apparent toward the end of March, a definite system of reporting incidents to the State and local law enforcement officials and to the press, both locally and nationally, was instituted. On May 14, the Secretary of the Interior finally issued a strongly worded public statement condemning the terroristic elements and calling for more vigorous local law enforcement. Approximately 2 weeks later the Secretary took occasion at a press conference to denounce a California justice of the peace who had suspended sentence upon a man convicted of shooting into the home of a returned evacuee. By these means, the public both on the West coast and throughout the Nation was made gradually aware of the insidious manifestations of racial prejudice in California and of the less violent forms of opposition both there and in the Northwestern States. Before the end of June scores of newspapers in all sections of the country had brought the issue of West coast terrorism sharply into focus and had aroused a widespread demand that the returning evacuees be accorded fair and decent treatment.

As the period ended, there were encouraging signs that this heightened public awareness of the issue was having a salutary effect. The tone adopted by many of the opposition groups was becoming progressively milder and more defensive, while several organizations of West coast citizens friendly to the evacuees were growing increasingly active and outspoken. Most significant of all perhaps, the incidents

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of terrorism dwindled sharply, both in frequency and violence almost immediately after the Secretary's two public statements. In fact, there was no incident of major importance between the Secretary's second statement and the end of the fiscal year.

Financial Assistance for Resettlers

On the day after announcement of revocation the War Relocation Authority sent to all evacuees, both in and out of centers, a comprehensive statement on the types of assistance that would be available thereafter for relocating families and individuals. Travel and transportation of personal properties, which had previously been extended only on a showing of need, were made available generally to all persons leaving the centers for relocation. Such assistance was also extended to those who had previously relocated outside the West coast area and who now wished to go back to their States of former residence. Additional grants, to cover the cost of subsistence while traveling as well as expenses during the transition period immediately after arrival at destination, were continued for those persons in actual need of such supplemental help.

At each center, however, there was a group of people who required assistance over and above these types of aid in order to become satisfactorily reestablished in private life. This group included those whose family resources had been seriously depleted as a result of evacuation, unattached individuals who were incapable of obtaining self-support, and families without any prospect of adequate continuing income. Early in the relocation program, the War Relocation Authority completed an agreement with the Social Security Board in cooperation on a program of financial assistance specifically designed to meet the needs of such people as well as those resettlers who might be faced with a sudden, unpredictable, short-range need for help. This program, actually administered by State and local public welfare agencies, was financed by funds made available to the Social Security Board by the War Relocation Authority.

Before revocation of exclusion, there were comparatively few applicants for assistance under this program among the relocating evacuees. As the more able-bodied, primary wage-earners left the centers in increasing numbers during 1943 and 1944, however, the so-called "dependency" cases loomed steadily larger in the residual population. Accordingly, when the ban was lifted and plans for closing centers were announced, the War Relocation Authority began almost immediately to intensify and broaden the arrangements which had previously been made for handling dependency cases. Since most of the dependent evacuees could qualify for continuing public assistance only in their States of former residence, first attention was given to working out a satisfactory referral procedure with State and local

welfare agencies of the former evacuated area. At the centers staffs of trained welfare workers were geared up to the job of interviewing all families and individuals who had special problems of support, analysing their needs, and advising them of the types of assistance for which they might be eligible. Case summaries prepared at the centers were transmitted through the War Relocation Authority field offices to the State and ultimately the local welfare agencies.

Although the procedure for handling dependency cases was somewhat slow and cumbersome at first, it was streamlined and speeded up considerably throughout the spring. By the end of June, most of the delays had been eliminated, and the War Relocation Authority was able to plan for the final closing of the centers with full assurance that no genuinely needy person would be left without adequate means of support.

Employment and Housing

Because of the widespread need for workers of nearly all types, relocating evacuees experienced comparatively little difficulty during the year in finding job opportunities consistent with their individual qualifications. The problem lay, rather, in finding enough evacuees to fill the jobs which were available.

On the West coast, however, the resettlers enjoyed somewhat less freedom of job selection than in other sections of the country. Governmental regulations continued to debar the evacuees from employment in coastal fishing or waterfront work, while one of the more important labor organizations of the region—the International Teamsters Union—adopted a policy of categorically excluding from membership all persons of Japanese descent except honorably discharged veterans. In a few cases individual labor union members resisted working on the same jobs or in the same shops with the returnees and even threatened to strike if the Japanese Americans were hired.

The most noteworthy case of this kind occurred in May at Stockton, Calif., where some members of the International Longshoremen's and Warehousemen's Union attempted to foment a strike in protest against the employment of three returned evacuees. This action was promptly repudiated as contrary to the union's policy both by the international president and by the head of the San Francisco local which had jurisdiction over the Stockton unit. The protesting members were swiftly suspended from membership and were told that the union would tolerate no racial discrimination. A strike was effectively averted and the evacuees continued on the job.

Housing was a problem for resettlers in practically all of the Nation's largest cities and was particularly acute in the metropolitan centers along the Pacific coast. Shortly after the opening of the West coast field offices, intensive efforts were made to encourage the estab-

lishment of evacuee hostels in that region similar to those which had previously been operating in other sections of the country. These hostels, usually operated by church groups or other organizations interested in assisting Japanese American relocation, were designed to provide temporary accommodations for resettlers until a more permanent type of housing could be located. Before the fiscal year ended, about a dozen had been set up in principal West coast cities. The War Relocation Authority actively assisted in their establishment by making surplus relocation center equipment—such as bedding, cooking utensils, and the like—available to the sponsors on a loan basis.

Both on the West coast and elsewhere the Authority assigned staff members at its principal field offices to work full time in helping resettlers to locate housing accommodations and marshalled every available resource to overcome this particular problem. By the end of June substantial progress had been made toward the ultimate goal of assuring at least temporary accommodations for every individual and every family group leaving the relocation centers.

CENTER MANAGEMENT

The job of operating emergency-built cities for displaced persons of Japanese descent has never been more than a temporary expedient in the War Relocation Authority program. From the time when the long-range policies of the agency were first formulated in the summer of 1942, the Authority has always looked forward to the day when the evacuation orders would be rescinded and the shelter of the centers would no longer be required. The War Department's announcement of December 17, restoring freedom of movement throughout the United States to the great majority of the evacuees, eliminated in one stroke the center's chief reason for continued existence.

The revocation order did not, however, automatically transport the thousands of center residents to their chosen destinations, and it did not solve overnight all the manifold problems involved in dissolving these complex wartime communities. In order to prevent a chaotic mass movement and allow for individualized relocation planning and assistance, a spaced-out program of center closing was obviously essential. After careful consideration of factors such as transportation, available housing, and employment opportunities, the Authority decided that no center could be closed on a sound basis in less than 6 months but that all (except Tule Lake) should be closed within a year.

Because of the greatly increased emphasis on relocation preparations and the need to keep center management problems at a minimum, a policy was adopted immediately after revocation governing visits that might be made back to the centers by previously relocated

evacuees. At first, such visits were permitted only for purposes of completing family relocation plans or for emergency purposes and only with the advance approval of the appropriate War Relocation Authority field office. Later the advance approval requirement was eliminated, and each relocated evacuee was permitted a maximum of 30 days for visiting at the centers without regard to the purpose of the visit.

By the end of June all phases of center operations were well advanced toward final liquidation. Although there were still about 44,000 people to relocate and large amounts of Government property which eventually would have to be inventoried and processed through surplus property channels, the War Relocation Authority had every reason to believe that all centers could be closed by December and was contemplating the definite possibility of closing some at an even earlier date.

Construction and Maintenance

Revocation of the exclusion order brought immediate reduction of the construction and maintenance operations to a minimum, in all centers except Tule Lake, where it was necessary to complete a considerable program of buildings already under construction or planned. Likewise maintenance was pared down to the minimum consistent with efficient operation. By the use of lumber and other materials released through cancellation of many center construction projects, sufficient stock was available for all construction and maintenance, and the building of boxes and crates for the freight of relocating evacuees, without ordering new stocks. This was made more effective by the interchange of materials between the different centers.

Agriculture

During the first half of the fiscal year the agricultural program was in full operation, in accordance with the policy of producing as much of the food needed for the evacuees as possible. But with announcement of the closing date for the eight relocation centers an almost complete reversal was made. No crops were planted in the spring of 1945 with the exception of Poston and Gila, where vegetables could mature and be harvested by June 30. No additional beef cattle or poultry were purchased and the hog breeding program was discontinued. A program for the orderly fattening and slaughtering of the livestock on hand was put into effect. By the close of the fiscal year most of the livestock at the centers had been consumed.

Community Government

Sponsored by the Community Councils of seven centers, an all-center evacuee conference was held in Salt Lake City in February.

Approximately 30 delegates met for a week, discussing problems affecting the evacuees as a result of the opening of the West coast and announcement of center closure. The delegates prepared and approved a letter to the Director of the Authority requesting reconsideration of center closing and submitted a list of recommendations to facilitate resettlement and rehabilitation of those relocating. Although the Authority did not modify its policy on center closing, it gave careful consideration to the other recommendations of the conferees and instituted a number of procedural changes along the lines recommended.

Felonies, misdemeanors, and violations of administrative regulations decreased in all centers, and the general crime rate was small, compared with national rates.

Business Enterprises

Evacuee-operated business enterprises in the centers generally were in excellent financial condition at the close of the fiscal year, with assets on May 31, listed at \$1,237,369, or 16 percent lower than 1 year previously. Inventories were reduced during the fiscal year from \$872,000 to \$429,000 and the cash balance increased from \$441,000 to \$666,000.

Education

With the end of a vigorous 3-year school program in the centers set to coincide approximately with the close of the fiscal year considerable readjusting was necessary. School enrollment on the elementary, secondary and nursery school levels showed a drop of 2,780 during the year. The elementary and secondary enrollment at the beginning of the year was 18,772, and at the end of the year 16,399. The nursery school enrollment dropped from 1,928 to 1,521. A major part of these declines was the result of relocation. The records of pupils were checked to insure that all outstanding requirements would be met.

Medical Care

During the year there was a marked decrease in the activities of the maternity service as compared with that of the previous year, accounted for largely by the departure of a great many young married people. Total births were 1,745; deaths 541.

When the exclusion order was lifted, there were 700 patients under War Relocation Authority's general custodianship in West coast hospitals, including approximately 250 tuberculosis patients hospitalized there prior to evacuation; 108 mental cases transferred to institutions in their States of legal residence, following commitments from centers, and the remainder, chiefly mental patients hospitalized over a long period. Arrangements were made as of June 30, 1945,

for discontinuance of financial responsibility for hospitalization for 343 patients at approximately \$900 per day.

A January survey showed there were 190 tuberculous patients in the various center hospitals who would need long-time sanatorium care, and a gradual transfer of these patients to the west coast was begun in the spring. At the same time individual interviews were held with over 200 tuberculous patients in west coast hospitals and reports of these interviews were sent to the appropriate centers in order to further relocation by correlating the plans of the patients with those of their immediate family members.

Fire Protection

With millions of dollars of value and thousands of buildings under their guardianship, fire protection crews at the centers established an enviable record of only 245 fires during the year, with a total loss in buildings and contents of \$37,652, of which \$25,310 was Government property and \$12,342 private property. Granada center recorded only 10 fires; Poston with the greatest number had 48. Manzanar accounted for \$19,264 of the total loss of which \$19,051 resulted from the burning of three Government warehouses. The smallest loss at any center was \$170 at Central Utah.

ADMINISTRATIVE MANAGEMENT

Administrative aspects of center closures involved huge physical assets which must be accounted for and disposed of in an orderly manner. Teams composed of accountants and property experts were sent into the centers where all property records were being put in order, as the fiscal year closed. Surplus properties were listed and a conservation program was adopted which entailed an exchange of materials and supplies between centers. Under this procedure things needed in each center were listed, and where these needs could be filled from the surpluses of other centers, transfers were effected.

Procedures for mess operations were overhauled and a policy adopted that would require the closing down of a block mess hall when the population in a block dropped to 125 residents. This resulted in a considerable saving of manpower and supplies, as many blocks throughout the various centers fell within the scope of the closing order. As a further conservation measure, food stocks which had been carried on the basis of a 60 to 90 day supply, were reduced so that quantities on hand were sufficient for only 20 to 30 days.

A procedure was also developed for the final disposition of all War Relocation Authority records, and the schedule which was recommended to the National Archives and the Congress was given the stamp of approval, and put into effect.

Among other problems which the War Relocation Authority faced during its liquidation period was the question of what would happen to its hundreds of civil service employees. In an effort to find an answer, a personnel survey was conducted in the spring of 1945 to determine possible placement of staff members with other Government agencies. On July 1, 1944, there were 2,284 employees, 2,015 of whom were stationed in the field, while 269 staffed the Washington offices. On June 30, 1945, the total employment was 2,436, an increase of 152, as the relocation program was being developed into its final phases. Most of this increase was in the field, where the total reached 2,154, with 282 in the Washington office.

LEGAL DEVELOPMENTS

Litigation of vital concern to the evacuees, both in and out of the centers, was spread on the records during the year.

On December 18, the United States Supreme Court handed down decisions in the Fred Korematsu and Mitsuye Endo cases. In the former, the legality of the evacuation orders was sustained. In the latter the court held that the War Relocation Authority had no authority to detain and control the movements of citizens who were concededly loyal to the United States. Although the War Relocation Authority in anticipation of War and Justice Department assumption of responsibility for security measures, had been shaping its policies toward elimination of its leave clearance requirements in any event, the Endo decision made it unmistakably clear that detention of citizens solely on the grounds of race or ancestry could not be sustained before the courts.

Land laws aimed at alien Japanese began to crop up in various States. The Oregon Legislature adopted a law making the possession or ownership of land by Japanese and other aliens ineligible for citizenship a criminal offense, and amending the rules of evidence for the trial of cases arising under the State alien land law. A proposed Colorado constitutional amendment to authorize restrictions on ownership of land by aliens failed in a referendum in November. In California, a referendum petition for an amendment to the State alien land law to extend it to "dual" citizens as well as aliens ineligible for citizenship and to the ownership of watercraft as well as land failed for lack of a sufficient number of signatures. This same amendment was introduced in the State legislature at its session which closed in June, but failed to pass. Law enforcement officials in California instituted 28 civil suits to forfeit to the State land alleged to be held by Japanese aliens and the State of Washington instituted 13 similar civil suits.

SEGREGATION CENTER

As it became increasingly apparent that the West coast exclusion would eventually be rescinded and War Relocation Authority leave regulations simultaneously abolished, plans were developed for setting up relocation machinery at the Tule Lake Segregation Center. Under regulations of the Western Defense Command, it was anticipated that quite a large number of these evacuees would be eligible for resettlement on the west coast as well as elsewhere in the United States.

A policy was adopted for Tule Lake similar to that in effect for other centers and by the time the ban was lifted on January 2, the administration was ready. Prior to this time there had been only slight interest in relocation, but in January inquiries began to trickle into the newly established relocation office in the center. The first person to relocate from Tule Lake since it had been designated as a segregation center was a young man who departed for Minneapolis late in the month.

In the period between that time and the close of the fiscal year, 140 persons relocated directly from Tule Lake to outside communities. In addition, approximately 400 residents of Tule Lake who were out on seasonal leave effected permanent departures during this period, or were institutionalized outside, so that a total of more than 500 actually relocated between January 2 and June 30. The population remaining as the fiscal year closed was 17,454.

The fiscal year at Tule Lake got away to a rather turbulent start, with the murder on July 2 of the evacuee manager of the Business Enterprises. This was apparently the culmination of a feud between those evacuees who were willing to cooperate with the administration and those who were not. As a result of the stabbing, the board of directors and all key evacuee personnel of the cooperative resigned. Before the end of July the entire evacuee police force also had resigned, as the investigation into the murder became more intense. The murder was never solved, and the police department was reorganized as the Colonial Peace, to carry on. A reorganization of the Cooperative was also effected, and by the end of July the Business Enterprises were again functioning satisfactorily.

Twenty-seven Nisei were arrested in July, charged with failure to report for preinduction physical examinations, but at their trial at Eureka, Calif., the charges were dismissed when the court held that Selective Service did not apply to residents of Tule Lake, since it was a segregation center. Also in this month 16 men held in the Stockade, where the more belligerent were confined, went on a hunger strike which lasted 10 days.

There followed a period of agitation for "resegregation" by the pro-Japanese group, which began to promote Japanese culture through three societies, Sokuji Kikoku Hoshi Dan, for older men; Hokoku Seinen Dan, for younger men and Hokoku Joshi Dan for women. These societies sponsored early morning marching formations by their members and engaged in other pro-Japanese rituals intended to develop more strongly the Japanese pattern of living. These practices subsided, however, and much of the resegregation agitation also, with removal of 56 of the leaders to the internment camp at Crystal City, Tex.

In December the Department of Justice completed hearings on another 56 men who had asked expatriation, and these, together with 14 aliens, were transferred to the interment camp at Santa Fe, N. Mex. They left Tule Lake on December 28, 10 days after announcement of the lifting of the West coast ban. This announcement and the accompanying announcement of the liquidation of the other centers had a dampening effect on any demonstration by the population. In all, 1,416 persons were removed by the Justice Department from the Tule Lake center to interment camps during the fiscal year.

EMERGENCY REFUGEE SHELTER

On June 30 the Emergency Refugee Shelter at Fort Ontario, Oswego, N. Y., completed its first fiscal year under the administration of the War Relocation Authority, which was first designated for this responsibility on June 9, 1944.

While plans were being made to receive the European refugees as the 1944 fiscal year closed, the War Relocation Authority did not actually assume custody of the Fort Ontario grounds until July 30. Six days later, on August 5, the refugees arrived at the Shelter where housing had been prepared for them on the old fort grounds.

In the group were 982 persons ranging in age from infants to octogenarians, representing 18 nationalities. The largest national groups were 367 from Yugoslavia; 244 from Austria; 149 from Poland; 94 from Germany and 41 from Czechoslovakia. Others were from Belgium, Bulgaria, Danzig, France, Greece, Holland, Hungary, Libya, Rumania, Russia, Spain, and Turkey.

With so many nationalities represented the Administration was faced with complex problems caused by language, geographic and cultural differences. However, a plan of community organization was set up similar to that which had been operating in the relocation centers, with the exception of schools. Arrangements were completed on September 1, with school authorities in the adjacent town of Oswego, whereby the children of the refugees would be accepted on the same basis as American children. With the opening of classes, 189 of these children were enrolled.

Although the refugees were brought into the United States outside immigration quotas and were required to sign an agreement which stated that they understood they were to return to their homes after the war, it soon became apparent that the majority had no desire to return, that many had close relatives in the United States, and that most sections of liberated Europe were in no position to receive them. The most feasible alternative was to develop procedures under which those who desired to remain in America could be admitted under quotas which had not been filled since the start of the war. Early in the spring the War Relocation Authority began exploring the possibility of such a program, with the Departments of State and Justice, but no definite conclusions were reached by the end of the fiscal year. Meanwhile, members of the subcommittee of the House Committee on Immigration and Naturalization conducted hearings at the Shelter on June 25-27, inclusive, to determine the possibility and advisability of extending immigration status to the Shelter residents. As the year closed, this subcommittee had not yet announced its findings.

During the year there were 14 permanent departures from the Shelter. One person left on February 28 for the Union of South Africa, and 13 others returned to Europe on the Gripsholm on May 30. There were 10 deaths and 11 births during the year, leaving a net population of 969 as of June 30.

On June 6, the over-all responsibility for the Shelter program was transferred by order of the President from the War Refugee Board to the Department of the Interior.

CONCLUSION

As the War Relocation Authority approached the end of its unique experience in caring for a displaced racial segment of the American population, it becomes somewhat easier to evaluate that experience in proper perspective and to derive from it certain basic recommendations for the future.

First, the War Relocation Authority earnestly hopes that the United States will never again be faced with a similar problem.

Second, the Authority recommends strongly against putting displaced people in camps except for limited periods and under emergency conditions, such as natural catastrophe, where there is no feasible alternative.

Third, this agency has learned the grave dangers that lie in generalizing about a whole group of people and restricting their movements on the basis of such generalization. It believes deeply that no resident of this country should be detained or moved against his will merely because he is a member of some group. All actions of this kind should be based on painstaking examination of the person's individual record.

Fourth, the War Relocation Authority is under no illusions that it has completely solved all problems of the evacuated people of Japanese descent. After the last War Relocation Authority field office is closed, there will still be a tremendous job for American democracy in helping these people to become satisfactorily readjusted and in safeguarding their rights against the poison of racial discrimination. But this is a job which can be done most effectively by private organizations and individuals working close to the problem in the scores of communities where the resettling evacuees have made their homes. For more than 2 years the Authority has been encouraging such groups to assume an increasing measure of responsibility for evacuee adjustment and for protection of evacuee rights. It now looks forward to the termination of its own official life with full confidence that the work of fitting the evacuated people back into the main stream of our natural life will be carried forward with energy and zeal.

Board on Geographical Names

MEREDITH F. BURRILL, *Director*



In the latter part of the fiscal year 1943 the present Division of Geography which, together with the interdepartmental Advisory Committee constitutes the Board on Geographical Names, was greatly expanded to enable it to formulate quickly policies with regard to geographic nomenclature in areas of actual or potential military operations, and to provide on short notice great quantities of correct geographical names in war theaters. In performing this work the Division has acquired the know-how for dealing with nomenclature problems and has developed techniques for rapidly processing large numbers of names in a given area. This has enabled the Division to edit maps and manuscripts and to check lists involving hundreds of names in a relatively short time. These nomenclature policies going beyond the well-known names that appear on all small scale maps, these techniques for handling large numbers of names, and the acquisition of general experience with geographical names are important facilities which the Division of Geography is in a position to place at the disposal of the agencies concerned.

Great strides in the formulation of policy have been made following clarification of the working relations of the Division of Geography and the interdepartmental Advisory Committee by Departmental Order No. 2002 dated October 26, 1944, and published in the Federal Register for November 1, 1944. The Federal agencies and private geographical societies represented on the Advisory Committee on June 30, 1945, were as follows: Government Printing Office, Library of Congress, State Department, Office of the Chief of Engineers, Military Intelligence Service, Post Office Department, Office of Naval Intelligence, Hydrographic Office, Forest Service, Bureau of the Census, Coast and Geodetic Survey, Geological Survey, National Archives, American Geographical Society of New York, the Geographic Society of Chicago, Geographical Society of Philadelphia, and the National Geographic Society.

The need for readily available source materials to accomplish the work for the armed forces required the acquisition of a map collection of approximately 100,000 maps and a library of 12,000 volumes pro-

viding material applicable to the name problem. This is one of the largest general map collections in the United States and it is the only library of any size specializing in place-name materials.

In the course of war work the master card file with the cooperation of the armed services has been built up from 18,745 names to 990,390 names. This file is a facility which is believed to have no counterpart anywhere. In addition to the 33,273 names on which decisions have been rendered, more than three-fourths of the others have been processed according to standard directions, with extensive cross-referencing of variant names. In addition to the master card file a Mongolian word file of 30,000 cards has been compiled to decipher Mongolian names which consist almost entirely of descriptive terms. At the present time there is no comparable English-Mongolian dictionary in existence.

The replacement value of the card files, the name decisions, the map collection, and the library of the Division of Geography is estimated conservatively at \$850,000.

The value of the services of the Division of Geography to agencies concerned with place names is commensurate with the extent to which they use it and the completeness with which they rely upon it. Full value and complete consistency with regard to name usage can be gained only by a centralization of work on geographic nomenclature.

With the aid of the name file now at hand the Division of Geography is prepared to handle with a minimum of additional research all normal peacetime requests of Government agencies for names in the theaters of World War II and most such requests for foreign names in other parts of the world.

With the close of hostilities it is planned to apply the techniques, facilities, and experience developed during the war to the backlog of approximately 4,500 domestic name problems which have accumulated while high priority war work postponed their solution. It is further planned to anticipate name problems in areas where large domestic mapping programs are going to be conducted by compiling state or territorial gazetteers for which each name will be processed. Eventually the entire Nation and each of the territories will be covered by such a gazetteer which should reduce to a minimum name problems arising from future mapping programs on a scale of 1:62,500 or smaller.

Office of the Solicitor

FOWLER HARPER, *Solicitor*



SSTREAMLINING of review and advisory procedures enabled the Solicitor's Office, during the past fiscal year, to devote a major part of its efforts to the legal implementation of departmental programs for peacetime reconversion, while continuing to carry its regular load of normal departmental legal work and the extra load imposed by departmental war activities in fuel, mineral, territorial, and various other fields. Legal programs have been formulated for the broader use of the public domain; the extension and improvement of the Federal range for grazing purposes; the resumption of operations on a peacetime schedule of the vast recreational, scenic and historical facilities of the National Park System and the accommodation of the millions of expected visitors who have been unable to avail themselves of these facilities in recent years because of wartime restrictions to travel; the exploration for and the development of the mineral resources of the country; the completion of the vast reclamation projects interrupted by the war; the social and economic development of the territorial and island possessions; the programs for land utilization in aid of the sound rehabilitation of thousands of returning veterans; the development of public power; the disposal of surplus property; and many others embodied in pending or proposed legislation.

Most of the programs for reconversion have been conceived in legislation presented to the Congress and nearly all are related more or less intimately to activities of the Department. The future of the light metals industry—aluminum and magnesium—was the subject of extensive hearings before a committee of the Senate, at which the Nation's leading industrial and governmental authorities, including Secretary Ickes, and the heads of several affected departmental agencies, testified. The future of this industry is closely interwoven with the Department's interests, especially in the programs of the Geological Survey, the Bureau of Mines, and the several Federal power agencies, and the questions of law involved are manifold.

The pattern for the future is clearly reflected in legislation proposed and sponsored by the Nation's industrial, scientific and military leaders, including proposals for the resurvey of the Nation's mineral

reserves as the basis of future control and beneficial use; for the creation of a minerals stock pile for industrial and military requirements; for scientific research and development; for the release to industry generally of scientific knowledge acquired in this war from allied and enemy sources; and for the control of patents developed in whole or in part with Federal funds.

Proposals for postwar scientific research and development which have been presented to the Congress have raised questions of law demanding the most careful consideration, since hardly a bill has been introduced which would not duplicate, supersede, or at least curtail existing activities in this field now authorized to be conducted by Bureaus of the Department. The proposals for the stock piling of strategic materials were and will continue to be major legal and legislative problems of Department-wide concern.

The equitable control of patents developed with the aid of Federal funds and the prevention of the monopolistic exploitation of such patents, is the subject of much concern to both industry and the Congress. The Mines Division of the Solicitor's Office has been engaged in drafting regulations with respect to the granting of licenses and the protection of the Government's interests in departmental patents. Many of these patents, including a recent application for one covering a device to locate ores required in the development and control of atomic energy, are of great importance in the future economy of the Nation.

The bills to create regional authorities affect virtually every activity of the Department, and if enacted doubtless would incorporate many of the functions now performed by several departmental agencies—those of the Bureau of Reclamation would be particularly affected as would also those of the Bureau of Mines, the Geological Survey, the National Park Service, the Grazing Service, the General Land Office, the Fish and Wildlife Service, the power projects and other conservation activities. The preparation of reports for congressional committees considering these measures, the marshalling of facts upon which the Secretary and the heads of the various bureaus could base their testimony before those committees and the questions of law involved required months of legal research, preparation and analysis on the part not only of the Legislative Division of the Solicitor's Office but, also, of the lawyers of the bureaus involved.

As the plans develop for the future the vast amount of legal work which is inevitably bound up in the evolution of the reconversion programs becomes discernible. While the Legislative Division of the Solicitor's Office has been the clearing house for proposals originating in the Congress, or proposed for enactment by the Department, the entire legal staff of the Department necessarily has participated to the extent that plans affected a particular agency and its normal, peacetime functions.

SOLID FUELS ADMINISTRATION FOR WAR

The Legal Division of the Solid Fuels Administration for War drafted regulations and orders embodying the Administration's program for the distribution of limited supplies of bituminous coal, anthracite and other solid fuels. It prepared interpretations of provisions of the regulations and drafted exceptions and directions necessitated by constantly changing conditions in solid fuels' production and consumption. It continued to supervise the organization and functioning of industry advisory groups, and also handled all legal problems in connection with compliance proceedings brought to enforce regulations, and cooperated with the Department of Justice in criminal prosecutions. Following liquidation of the Coal Mines Administration in September 1944, and the transfer of the functions of that agency to the Solid Fuels Administration for War, the Division drafted the documents incident to the seizure and possession of struck coal mines by the Secretary under various Executive orders.

WAR RELOCATION AUTHORITY

On December 18, 1944, the United States Supreme Court announced two decisions of major significance to the program of the War Relocation Authority. They were *Korematsu v. United States*, 323 United States 214 (October 1944), in which the court upheld the constitutionality of the original Army orders excluding all persons of Japanese ancestry from west coast military areas, and *Ex parte Mitsuye Endo*, 323 United States 283 (October, 1944), in which the court held invalid the detention of an American citizen of Japanese ancestry conceded to be loyal to the United States. These decisions preceded by 1 day a revocation of the Army's mass exclusion orders and the institution by the Army of a plan for excluding individually from west coast military areas persons regarded as dangerous to the national security. Following these developments, the Solicitor's Office participated in the development and institution of a program designed to effect an orderly return of all eligible relocation center residents to normal communities and the prompt liquidation of the relocation centers, including the handling of legal problems relating to relocation center management, evacuee property management and disposal, and the rehabilitation of relocated evacuees.

GENERAL LAND OFFICE

The Law Division of the General Land Office handled more than 35,000 matters during the fiscal year, including assistance to the Department of Justice in the preparation of litigation; the rendering of legal opinions on a variety of subjects; claims relating to the public domain; the preparation of proposed legislation and reports on pend-

reserves as the basis of future control and beneficial use; for the creation of a minerals stock pile for industrial and military requirements; for scientific research and development; for the release to industry generally of scientific knowledge acquired in this war from allied and enemy sources; and for the control of patents developed in whole or in part with Federal funds.

Proposals for postwar scientific research and development which have been presented to the Congress have raised questions of law demanding the most careful consideration, since hardly a bill has been introduced which would not duplicate, supersede, or at least curtail existing activities in this field now authorized to be conducted by Bureaus of the Department. The proposals for the stock piling of strategic materials were and will continue to be major legal and legislative problems of Department-wide concern.

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As the plans develop for the future the vast amount of legal work which is inevitably bound up in the evolution of the recovery programs becomes discernible. While the Legislative Division of the Solicitor's Office has been the clearing house for proposals originating in the Congress, or proposed for enactment by the Department, its entire legal staff of the Department necessarily has participated to the extent that plans affected a particular agency and its normal peacetime functions.

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ing bills; the drafting of regulations affecting the public domain and certain hearing procedures; and assistance rendered to congressional committees on proposed surplus property legislation and on various questions with respect to the administration of minerals in the public lands, particularly those relating to the leasing of potassium resources, the legality of withdrawals of public lands made by the Secretary of the Interior, and the purpose and effect of the potassium leasing regulations of January 4, 1945.

GRAZING SERVICE

The Office of the Chief Counsel of the Grazing Service continued to handle an increasing volume of work, including the interpretation of statutes, rules and regulations, and orders affecting the administration of the Federal range; the preparation of contracts and cooperative agreements with individuals, livestock associations, State cooperative grazing districts, and Federal and State agencies; the drafting of proposed rules and regulations, instructions and forms necessary to administer the Taylor Grazing Act; the codifying of rules and regulations for publication in the Federal Register; and many other related subjects.

BUREAU OF RECLAMATION

During the past year, apart from the time devoted to wartime activities, the attorneys of the Bureau of Reclamation, both in the Office of the General Counsel in Washington and in the field, have been engaged in the formulation of plans and the preparation and revision of contracts looking toward a return of the Bureau to its peacetime role and the early resumption of irrigation and other construction projects suspended during the war in accordance with War Production Board regulations. Part of a series of 37 basin reports, to be submitted to the Congress, providing postwar plans for the comprehensive development of the water, land, and hydroelectric power resources of the major basins of the West, are receiving legal review as of the writing of this report. Contracts were drafted involving the disposal of metropolitan water district unused electric energy, heretofore sold to Defense Plant Corporation for use in its magnesium plant, to the city of Los Angeles, Southern California Edison Co., and the California Electric Power Co. Negotiation of repayment contracts with the three irrigation districts of the Columbia Basin project, Central Valley project studies, the organization of three Montana irrigation districts, the treaty between the United States and the United Mexican States relating to the utilization of the waters of the Colorado, Tijuana, and Rio Grande Rivers, and numerous other intricate legal problems involving the multiple-purpose projects of the Bureau, demanded the attention of the Legal Division. Bureau attorneys conducted or participated in a variety

of court cases arising in connection with Federal reclamation. After years of litigation, the United States Supreme Court on June 11, 1945, finally handed down an opinion in the best known and perhaps the most important case, *Nebraska v. Wyoming and Colorado, United States, Intervener*, defining the scope of State and Federal authority in interstate streams.

GEOLOGICAL SURVEY

The Office of the Chief Counsel, Geological Survey, has furnished the legal implementations of the bureau's program in the search for and utilization of the Nation's mineral resources. It participated in the negotiation of 22 new unit agreements embracing 198,408 acres providing for immediate exploration and development of wildcat areas for oil and gas—to discover new oil reserves to replace dwindling known reserves. Seven communitization agreements were approved for the pooling or consolidation of Federal and non-Federal lands required under regulations of the Petroleum Administrator for War as a condition prerequisite to the use of material in drilling wells—a program designed to conserve vital materials without impeding maximum production. An agreement between the Navy and Interior Departments was consummated with respect to the supervision of the lands embraced within the Naval Petroleum Reserves.

An important victory was won in the case of *United States v. General Petroleum Corporation, et al.*, involving additional royalties claimed to be due the United States from the holders of Federal oil and gas leases in the Kettleman Hills oil and gas field, California. The United States District Court held that the Secretary of the Interior has the power, under the Mineral Leasing Act of February 25, 1920, to determine the value of oil, natural gas, and natural-gas gasoline, or any of them, which ruling, if it becomes final, will result in the recovery of additional royalties estimated roughly at \$1,500,000. The Chief Counsel's Office engaged in the defense of the case of *The Ohio Oil Company v. United States*, brought to recover oil and gas royalties alleged to have been wrongfully exacted by the Secretary of the Interior and, although this suit involves only \$10,000, the decision will affect other royalties paid to the United States amounting approximately to \$250,000.

NATIONAL PARK SERVICE

The Office of the Chief Counsel, National Park Service, during the fiscal year handled a large volume of matters involving jurisdiction with respect to hunting, disposal and control of wildlife, and the regulatory powers of the Federal Government over mineral locations and non-Federal lands, in areas administered by the National Park Service, questions with respect to the use of park roads, Federal and

State jurisdiction over parkway crossings, and the Service's authority as to public water reserves and power licenses in national park and monument areas. There were also many legal matters inherent in Service administration, such as water rights, land acquisition, wartime use of areas, drafting and reviewing permits and contracts, preparation of legislation, and assistance rendered the Department of Justice in the Jackson Hole National Monument case of *Wyoming v. Franke*, in which the authority of the Federal Government in establishing the Jackson Hole Monument was upheld by the court in a decision of February 10, 1945. The office had the responsibility for the preparation of the National Park Service law book supplement, as well as the compilation of proclamations, and orders relating to areas in the national park system. The Service's postwar programs of major importance in planning, construction and land acquisition, also required constant legal consideration and counsel.

FISH AND WILDLIFE SERVICE

Participation by the Fish and Wildlife Service, in international fisheries problems became intensified during the year and brought out many questions for consideration by the chief counsel, both in frequent interdepartmental discussions and in the drafting of proposed agreements and legislation. At the same time, studies of the effects on the development and conservation of the wildlife and fishery resources of the numerous proposed irrigation and flood-control projects raised a variety of legal and legislative questions. Proposed legislation relating to the control of pollution and to other specific phases of wildlife conservation affecting long-time programs required the preparation of numerous reports. Of interest were the problems involved in negotiating for the transfer to the government of state lands lying in the Everglades section of the State of Florida. In anticipation of intensified hunting during the 1945-46 season, certain provisions of the migratory waterfowl regulations were revised with a view to offsetting any marked decrease in the waterfowl population.

DIVISION OF TERRITORIES

Implementing the departmental program of increased home rule in the territories, the Office of the Chief Counsel, Division of Territories, in cooperation with the Solicitor's Office, drafted a series of bills for introduction in the Congress and in the territorial legislature. Among the bills so drafted and enacted during the past fiscal year were bills outlawing racial discrimination in Alaska, and providing for a referendum on Alaskan statehood. Conferences with territorial officials and with the War Department culminated in military and presidential proclamations terminating martial rule in Hawaii. The legal staff of the Division of Territories assisted the Department

of Justice in several important cases involving the interests of the Department and the local governments; numerous legal memoranda and opinions with respect to controversial questions were prepared; Executive orders authorizing a variety of activities; and much time was devoted in acting as liaison between the territories and other departments of the Federal Government. The counsel-at-large for Alaska continued to represent the Solicitor and to protect the interests of the Federal Government in the resources of the Territory, handling a most diversified variety of problems affecting property and individual rights.

LEGISLATIVE DIVISION

The variety and volume of matters passing through the Legislative Division continued to increase. Legislation introduced, including reports to committees, the Bureau of the Budget and related correspondence, involved 2,698 items; proposed legislation by the Department, 377 items; legislation proposed by other Departments, 104 items; bills introduced of interest to the Department, 738 items; laws enacted affecting the Department, 101 items. In addition the Division covered all pertinent congressional committee hearings and submitted reports where necessary; prepared or reviewed statements to be made by officials before committees; and participated in all sessions of the Departmental Legislative Committee.

PUBLIC LANDS DIVISION

A substantial part of the work of the Public Lands Division involved questions arising in the administration of the Mineral Leasing Act, particularly with reference to oil and gas matters. Considerable time was devoted to cooperation with a committee from the oil industry in considering suggestions for amendments to the act. The possibility of augmenting the Nation's future oil supply from deposits in submerged coastal lands below low tide and the propriety of Federal administration of these reserves also engaged much attention. An original Supreme Court proceeding to determine title to the mineral rights in these lands is being urged as the appropriate method of settling this question. With the aid of the Division in preparing appropriate regulations and a form of cooperative agreement, an outstandingly important program for sustained timber yield, the first of its kind, was put into effect for the revested Oregon and California railroad lands, reconveyed Coos Bay Wagon Road lands and intermingled State, county, and privately owned timberlands. The Department's policy of conserving isolated tracts for their most economic use, including possible inclusion in Federal, State, or local projects, was clarified and public sales of such tracts approved only after careful consideration. Effective progress was also made in an effort to eliminate foreign control of valuable public land de-

posits of sodium borates and various forms of potassium as minerals vital to our national economy. The Division actively conducted litigation seeking to preserve title in the United States to rich sodium borate lands and railroad grant lands and to sustain administrative practice under the Mineral Leasing Act.

CONSERVATION DIVISION

Matters of outstanding interest handled by the Conversation Division during the fiscal year were original opinions with respect to the excess-land provisions of the reclamation laws; the application of Canada-United States trade agreements to action proposed under amended salmon fishery orders; the acreage limitations on grazing districts under the Taylor Grazing Act; power rate schedules, interest requirements, repayment periods, and minimum revenue requirements for power generated and sold from the Columbia Basin (Grand Coulee) power project; advice to the Governors of Puerto Rico and Alaska as to the extent of their authority in certain matters; questions concerning the liquidation of prewar debts in Japanese currency during Japanese occupation of Manila; and questions of Philippine Constitutional law growing out of the reoccupation of the Islands by the American Forces.

In addition to the usual volume of inquiries involving all phases of personnel and fiscal law, new questions arose with respect to the application of the war overtime pay statutes; the assignment of Federal personnel for duty in foreign countries; the acceptance of foreign-national trainees for assignment within the Department under the Government's over-all cultural-cooperation program; emergency employment of aliens, and the effect of the President's order of June 6, 1945, transferring to the Secretary of the Interior over-all responsibility for the Emergency Refugee Shelter at Oswego, N. Y. The Division continued to render opinions on questions submitted from all bureaus of the Department on matters affecting delegation of authority, damage claims, and administrative findings on appeals from contracting officers' findings of fact, as well as contract matters generally. Of particular interest in connection with the latter was the termination of a contract with private contractors for the construction of an oil refinery in foreign territory, and the negotiation and settlement of a claim by the Department against the operator of the Department's cafeteria.

MINES DIVISION

The Mines Division continued to serve in the dual capacity as a branch of the Solicitor's Office and as counsel for the Bureau of Mines. Among the important services performed has been the work involving patents. Some 67 new inventions have been processed for the De-

partment and 9 for the Synthetic Liquid Fuels Division; 35 Solicitor's opinions have been written concerning the rights of inventors, and 15 patents have been secured through the services of the Department of Justice, 10 of these are assigned outright to the Government. There are pending in the Patent Office approximately 120 patent applications. An amendment to the departmental patent regulations and a new set of regulations governing the granting of licenses under patent rights, if adopted, will centralize the licensing system, protect the Department's interests in inventions and make possible control over information concerning the state of the Department's title to patents.

The Division advised in the establishment of the synthetic liquid fuels program; 31 contracts were processed, 9 inventions studied and applications are going forward to the Patent Office. It is anticipated that this work will assume greater importance as the synthetic liquid fuels program develops. The work of explosives control increased materially; 35 license revocation proceedings were prosecuted. A bill to continue the safety features of wartime explosives control has been drafted and submitted to the industry for discussion.

During the year approximately 200 contracts were reviewed, drafted, redrafted or approved, including approximately 60 for exploratory drilling, 33 for supplies, 25 for cooperative ventures, 35 for architects, engineers, and construction, 10 for mining operations, and other miscellaneous matters including helium.

The Division directed a cooperative in-service training program for attorneys of the Interior Department and 14 cooperating agencies.

PROPERTY ACQUISITION DIVISION

The Property Acquisition Division participated in the preparation of contracts for the purchase of properties and performed the legal work in connection with land acquisitions required for the helium program, synthetic liquid fuels program, and mineral exploration programs of the Bureau of Mines for war and postwar use. It reviewed abstracts of title to more than 237 separate parcels involving over 211,650 acres of land acquired by the Government under the Forest Exchange and the Taylor Grazing Act, and also approved title to thousands of acres of donated land accepted by the Government for national parks. The consolidation of Indian land holdings into usable economic units and the acquisition of homes for Indians also involved considerable detailed legal work.

INDIAN DIVISION

The work of the attorneys of the Indian Division of the Solicitor's Office in cooperation with Bureau lawyers has been directed in great measure toward the fulfillment of long standing treaty and other obligations of the Government to the Indians. A final settlement with

the State of Wisconsin brings to a close a 91 years' controversy over the title to certain lands located within the boundaries of the Menominee Indian Reservation and effectually restores them to the Indian reservation. Hearings were held in Alaska to determine native fishing and other occupancy rights which have been matters of controversy for many years. Assistance was rendered to the House Committee on Indian Affairs in preparing an Indian claims bill which would attempt to settle, once and for all, any and all claims of Indians against the United States. The Department's position in the protection of Indian land titles was sustained in the case of *United States v. Drummond*, 324 U. S. 316, involving the interpretation of highly complicated laws pertaining to Osage Indians in Oklahoma; the court also ruled the United States to be a necessary party to actions in State courts in order that it be bound in Indian cases. The Division also participated in the preparation and presentation of other important cases including *Anglin & Stevenson*, 145 F. (2d) 622, holding that the Federal court could determine an award of attorney fees out of the restricted estate of a deceased member of the Five Civilized Tribes in a suit involving the quieting of title and determination of heirs; *United States v. Board of Commissioners of Fremont County*, 145 F. (2d) 329, holding that lands purchased with funds of an Indian tribe, conveyed to United States in trust for the tribe, are not subject to State taxation; *House v. United States*, 144 F. (2d) 555, 65 Sup. Ct. 270, upholding the right of the United States to maintain a suit for accounting of funds of a full-blood Indian of the Five Civilized Tribes released by the Superintendent without authority of law; *Board of Commissioners of Osage County v. United States*, 145 F. (2d) 1022, affirming the decision of the lower court that the act of June 20, 1936 (49 Stat. 1542), as amended, exempting certain Indian-owned lands from taxation, applied to Osage Indians, and that designation of the homestead as provided in the act is not a condition precedent to the tax exemption granted by the act where the Indian owns more than 160 acres of purchased land; and *County of Thurston Nebraska v. United States*, 149 F. (2d) 485, upholding the constitutionality of the tax exemption acts of June 20, 1936 (49 Stat. 1542), May 19, 1937 (50 Stat. 188), as applied to lands purchased by Indians in the State of Nebraska.

Legislation affecting the restricted lands of Indians of the Five Civilized Tribes was introduced in the present Congress looking to the quieting of titles affected by the decisions of the Federal courts in the cases of *United States v. Hellard*, 322 U. S. 363; *Murray v. Ned*, 135 F. (2d) 407, and *Williams v. United States*, 139 F. (2d) 83. The departmental reports to the congressional committees were prepared in this Division and several amendments suggested therein were adopted by the Congress. Act of July 2, 1945 (Public Law 116, 79th

Cong., 1st sess.). A bill (H. R. 2294) was introduced during the year which if enacted would provide a uniform code of descent of restricted Indian lands. Legislation establishing a new technique in securing repayment of construction charges on Indian irrigation projects was favored by the Division. Act of July 14, 1945 (Public Law 149, 79th Cong., 1st sess.).

The work of the Indian Division during the year relating to war activities involved the giving of legal advice and the review of correspondence, leases, permits and other agreements looking to the discovery and development of strategic minerals and the utilization of Indian and public lands for military purposes and increased food production. Several hundred thousand acres of virgin land in Wyoming, Montana and other States were placed under geological and geophysical prospecting permits during the year.

Division of Information

JOHN E. RYCKMAN, *Director*



DURING most of the 1945 fiscal year the Division of Information was still occupied largely with keeping the public acquainted with the Department's single-minded efforts to supply the essentials of war unstintingly from the Nation's natural resources. Before the year's end, however, with the collapse of the Nazi regime and with unmistakable signs of a similar denouement in the Pacific, the Division began to prepare for a shift of emphasis from the profligate expenditure of nature's treasures to the Department's traditional policy of conservation.

Just as foresight had prepared the Department for an immediate shift to a war basis before nightfall on Pearl Harbor Day, plans had been in the making for more than a year against the possibility of an immediate peace.

Thus, while still conforming to Office of War Information and other wartime security regulations in the handling of such informational programs as the Solid Fuels Administration for War, in exercising judicious restraint in disseminating information regarding the important war-related work of the Bureau of Mines, the Geological Survey and other agencies, the Division was getting ready to resume its peacetime activities that so long had lain dormant.

For example, the Division originated and prepared a comprehensive series of articles dealing with the Department's plan to proceed with postwar construction and conservation programs designed to give employment to veterans equivalent to 1,500,000 man-years of work over the first 10 postwar years. This material was published, with appropriate illustrations, in whole or in part by at least a score of nationally circulated magazines.

Before the end of the year the Division also was responsible for writing and publishing a pamphlet entitled "Our Last Land Frontiers," designed as a guide to veterans in their desires to settle on public lands both in continental United States and Alaska. This booklet proved to be one of the most popular ever issued by the Department with 20,000 copies being distributed by the Department

alone, and many other thousands through veterans' organizations, and through separation centers of the armed forces.

In addition to the booklet, the Division prepared a synopsis in popular form which was published by several national syndicates serving several thousand daily and weekly newspapers and by a dozen or more nationally circulated magazines.

These are merely examples of the directional work of the Division designed to integrate the informational programs of the Department's various bureaus and offices having to do with the development and wise use of such natural assets of the Nation as metals, power, fuel, helium, food, land, timber, and fisheries.

In other words, the Division continued to function as the directing and coordinating office of the Department through which all informational material is channeled from the bureaus to the public. This applies not only to day-to-day press releases of general circulation but also to books and pamphlets prepared by the Bureaus on specialized subjects, over which general printing supervision is exercised by the Publications Section.

The Division was also responsible for the editing, designing the format and supervision of the printing of the Secretary's annual report, as well as for the publication of *Inside Interior*, a monthly newspaper intended to keep the Department's own employees abreast of its activities.

There were no appreciable changes in the organization set-up of the Division, consisting of the Director's office, Radio, Publications, and Photographic Sections, although some changes in assignment of duties have been effected as changing conditions required.

RADIO SECTION

Throughout the year the Radio Section, operating the only modern broadcasting and recording studios in the Government, continued its intensified war service to most war-engaged Federal agencies, under the general supervision of the Director of Information.

Extensive and almost constant use was made of the studio's facilities by the Office of Strategic Services and by the Army and Navy in the preparation of secret programs having to do with psychological warfare. Special training programs were recorded for use in every theater of operation, and, toward the end of the fiscal year, recordings were already begun for use in demobilization work on ships and in Army centers of concentration.

Numerous live programs, as well as recordings, were prepared and broadcast through these facilities for overseas use by the Office of War Information and other agencies affiliated with it. In this work as many as 29 different foreign languages were used.

In addition, special programs, spot announcements, and other material for broadcast were produced for such departmental agencies as the Solid Fuels Administration for War and the War Relocation Authority.

One of the outstanding jobs performed by the Radio Section was the complete production of a series of six 15-minute recordings entitled "This Is Puerto Rico," prepared under the auspices of the insular Government of Puerto Rico. This series, an educational and documentary feature, was designed for use in more than 2,500 high schools of the country to acquaint the rising generation with this American outpost in the Caribbean.

PUBLICATIONS SECTION

The enlarged functions, begun last year, by which the Publications Section is made responsible not only for the procurement of printing but also for editorial content and format of bureau publications, have been continued with obvious success.

Not only have important economies been effected by centering in this section the power to reject faulty or undesirable manuscripts, but better design and more attractive publications have resulted. There is still much to be done in presenting to the public a better-rounded set of publications on the Department's activities. But a good start has been made and further improvements will be accomplished as the Department gets into its stride of peacetime work.

PHOTOGRAPHIC SECTION

While the major portion of the Photographic Section's efforts were devoted to furnishing photographs and other illustrations to Department agencies directly concerned with the war, it also began preparations for enlarged activities in anticipation of peace.

Toward the end of the year, for example, the Division compiled and published a listing of about 1,000 background photographs selected from many thousands of negatives in the Department's photographic files. The list of selected photographs, depicting historic landmarks and other subjects of permanent interest to students of the Nation's natural resources, was furnished to editors of important newspapers, magazines, and photographic syndicates as a backlog of available illustrative material upon which they are privileged to draw in connection with stories or articles dealing with any of a large number of subjects within the Department's purview.

During the year the Division also inaugurated a fortnightly News Picture Service, by means of which photographs of current interest are distributed to about a score of news picture syndicates, illustrated feature services, magazines, and newspapers. Thus, the Department, with comparatively little public expense, is able to enlarge a thousand-

fold its effectiveness in acquainting the public with its varied activities. This service has proved so popular throughout the country that, with the coming of peace, it is contemplated that the Division of Information will be called upon to make it a weekly instead of a fortnightly feature.

These activities of the Photographic Section, while increasingly important, are still virtually incidental to the regular volume of work that it has been called upon to perform. Its principal work, from the standpoint of volume, has continued to consist of furnishing illustrative material for bureau publications, progress reports to Congress and the like, as well as meeting a constant demand for material to illustrate textbooks, guidebooks, pamphlets, and travel literature requested by scientific, trade, and other magazines and publishing organizations.

Division of Personnel and Management

Mrs. J. ATWOOD MAULDING, *Director*



WITH the war continuing throughout another year our immediate problem has been the securing of personnel sufficient in number and quality to meet the war needs. Recruitment has been difficult, especially to meet the continuing demands of the Geological Survey and the Bureau of Mines for geologists, engineers, metallurgists, and other specialized personnel, which has made it necessary to ask for occupational deferments from the military service for some in these groups. Recruitment has also been especially difficult for stenographic and typist positions where the Civil Service Commission has been able to supply few eligibles, and replacements have been dependent upon applicants found by the Department. Special effort has been made to fill as many positions as possible with women, and with men not eligible for military duty. At present fewer than 15 percent of our permanent employees are subject to military service. More women are employed in the Department than ever before, the latest figure being 10,676.

More than 7,500 Interior Department men and women have gone into the armed forces; approximately 500 have been discharged and returned to work. These employees were either placed in their old jobs with no loss of seniority rights or were given higher-grade assignments. One hundred and three of our employees have died in the war and eighteen are missing.

While the number with specialized training and experience deferred from military service is slightly higher than a year ago, this is accounted for by the more liberal policy of the Selective Service System for deferring men over 30 and the necessity for making deferment requests for those found physically unfit for combat. The increase, however, has all been in the older age groups as the number of deferments for those below 30 has been drastically reduced.

The Department continues to fill positions above the entrance grades by promotion from within so far as qualified candidates are available. As part of the program to increase the productive capacity of Interior employees, the Training Section conducted across bureau lines during the year refresher courses in typewriting and shorthand, personnel

administration, secretarial training, and efficiency ratings, as well as orientation classes for new employees. The Department assigned two employees this year to the administrative internship program of the Civil Service Commission.

The Classification Office has allocated approximately 7,811 positions during the year and has made numerous surveys of groups of positions in the field. One of the important accomplishments of the Office has been the establishment of a Standards and Specifications Section to assist in preparing and publishing standards for the allocation of field positions under the Classification Act, which was directed by Executive Order 9512. This will be to a large extent a continuation of studies already started to establish standards for typical positions in the field services of the Department.

On September 8, 1944, the basic policy governing wage-fixing for employees not within the purview of the Classification Act was fixed by Secretarial order. On March 30, 1945, detailed regulations and procedures were issued by the Director of Personnel. In these regulations the procedure fixing rates of pay for ungraded employees by wage boards, which had been followed previously in several bureaus, was extended as a uniform method throughout the Department.

Morale in the Department is high despite the abnormal conditions of war. The number of grievances, disciplinary actions, and appeals of efficiency ratings have continued to run small.

Services to employees relating to group insurance, hospitalization, health, credit, loans, and counseling have been maintained, and with respect to counseling have been implemented further. The recreation program established under the guidance of the employee counseling service is felt to be of inestimable importance as a means of communication between employee counselors, personnel officers, and others interested in employee relations in the Department.

While meeting the immediate war demands, we have tried to strengthen the whole personnel structure of the Department for better administration and postwar expansion. We are proceeding with the program of decentralization, looking to the acceptance of more responsibility by the operating bureaus, the Division being concerned mainly with the formulation of good policies and the maintenance of sound personnel standards. In line with this objective, the Office of the Deputy Director of Personnel in Chicago was discontinued in January 1945, and a delegation of considerable appointing authority was made by the Secretary to the three bureaus headquartered there.

The Division is also gearing itself to the veteran placement problem. As one important step, a veterans placement unit has been established to insure that veterans are apprised of and receive their full rights, and that the Department is able to take advantage of new

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Interior Department Museum

H. L. RAUL, *Museum Curator*



THE Interior Department Museum maintains constant and direct contact with the public, through its modern visual educational techniques. It is an efficient instrument to visualize the manifold functions of the Department. More than 100 display cases exhibit material of great historic and scientific interest. They reflect the history, aims, and current activities of the Department, from its beginning, almost a century ago, to the present. Some of them refer to the Department's contributions toward victory.

ATTENDANCE AND FOREIGN VISITORS

During the past year approximately 46,000 persons visited the museum. The Visitors' Register records visitors from every State in the Union with the exception of Delaware. Registrations were received also from Alaska, Hawaii, Philippine Islands, and Puerto Rico. Many visitors from foreign countries also have demonstrated interest in the activities of the Department as illustrated in the museum, and registrations were received from Barbados, Bermuda, Brazil, Canada, China, Colombia, Czechoslovakia, Dominican Republic, England, France, Haiti, Honduras, Italy, Malaya, Mexico, New Zealand, Poland, and Romania.

COLLABORATION WITH BUREAUS

With the assistance of the Bureau of Reclamation, five display cases were completely revised and new material designed to illustrate the double use of water for irrigation and power production, and for war, domestic, and industrial uses. Featured also are methods of flood control, improved navigation, wildlife refuges, and recreational opportunities. Among the revised displays are colorful representations of Central Valley project and building Grand Coulee Dam. One of the recent additions is a new scale model of a modern, 80-acre irrigated farm, showing how water is brought from Reclamation reservoirs to operate an irrigated farm on a year-round basis, and electric fences which separate rotation pastures.

An engraved brass bar, 3 feet in length, designated as the Standard Yard, is exhibited in the General Land Office gallery. This is the original standard which was sent to the Territory of Nevada by the Office of United States Weights and Measures, in June 1861, for the purpose of establishing and checking standard measurements. It was formerly used by the Office of the Surveyor General to check surveyors' chains in surveying the public land. Three large silhouettes entitled "Steamboat and Canal Days," "The Roundup," and "The Sheepherder," totaling 22 feet in length, designed and completed in the museum, were installed in riches over related display cases in the General Land Office gallery. These complete the series of seven historical subjects portrayed by silhouette in this gallery.

A panoramic pictorial enlargement, approximately 12 feet long, portraying the Wyoming Elk Herd, is a new display in the Fish and Wildlife gallery.

In collaboration with the Geological Survey, new material for three display cases and three large wall niches are in preparation.

A large photo-mural, in full color, illustrates the numerous outdoor activities and recreational facilities provided by the National Park Service for residents of the District of Columbia and neighboring communities. This is particularly interesting during the present period of wartime travel restrictions.

Among the special exhibits is a photostat copy of a chart of the northern portion of Luzon Strait, Philippine Islands, which was seized from the Japanese in the Central Pacific, and insignia taken from members of the Nazi armed forces.

COOPERATION WITH OTHER AGENCIES

During the past year the museum has served many organizations, including the San Joaquin Pioneer Museum and the Haggin Memorial Art Galleries of Stockton, Calif.; American and Canadian Sportsmen's Show, Cleveland, Ohio; University of Oregon; State Department; War Department; Navy Department (Office of Naval Records and Library, Taylor Model Basin, and Bureau of Ships). The majority of these services concerned modern display methods, scale model, and diorama techniques. Services in connection with training methods and materials used in visual education and in veterans' rehabilitation programs were rendered to the American Red Cross; Walter Reed General Hospital; and the Disabled Veterans Educational and Reconditioning Service of the Newton D. Baker General Hospital, Martinsburg, W. Va.

Suggestions were outlined in last year's annual report for possible use of the museum's facilities for postwar rehabilitation work, particularly for returning veterans who were on military furlough from this Department.

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While meeting the immediate war demands, we have tried to strengthen the whole personnel structure of the Department for better administration and postwar expansion. We are proceeding with the program of decentralization, looking to the acceptance of more responsibility by the operating bureaus, the Division being concerned mainly with the formulation of good policies and the maintenance of sound personnel standards. In line with this objective, the office of the Deputy Director of Personnel in Chicago was discontinued in January 1945, and a delegation of considerable appointing authority was made by the Secretary to the three bureaus headquartered there.

The Division is also gearing itself to the veteran placement problem. As one important step, a veterans placement unit has been established to insure that veterans are apprised of and receive their full rights, and that the Department is able to take advantage of the

nowledges and skills which they may have acquired while in the service.

A personnel conference was held the week of June 4, in Washington, bringing together the personnel officers of all of the bureaus, including those in the field, for a review of policies and programs and for a look ahead to the reconversion period.

At the close of the fiscal year the Department had 44,453 compensated employees, 4,686 in the Washington metropolitan area, and 39,767 in the field; in addition, there were 1,546 uncompensated personnel.

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Interior Department Museum

H. L. RAUL, *Museum Curator*



THE Interior Department Museum maintains constant and direct contact with the public, through its modern visual educational techniques. It is an efficient instrument to visualize the manifold functions of the Department. More than 100 display cases exhibit material of great historic and scientific interest. They reflect the history, aims, and current activities of the Department, from its beginning, almost a century ago, to the present. Some of them refer to the Department's contributions toward victory.

ATTENDANCE AND FOREIGN VISITORS

During the past year approximately 46,000 persons visited the museum. The Visitors' Register records visitors from every State in the Union with the exception of Delaware. Registrations were received also from Alaska, Hawaii, Philippine Islands, and Puerto Rico. Many visitors from foreign countries also have demonstrated interest in the activities of the Department as illustrated in the museum, and registrations were received from Barbados, Bermuda, Brazil, Canada, China, Colombia, Czechoslovakia, Dominican Republic, England, France, Haiti, Honduras, Italy, Malaya, Mexico, New Zealand, Poland, and Romania.

COLLABORATION WITH BUREAUS

With the assistance of the Bureau of Reclamation, five display cases were completely revised and new material designed to illustrate the double use of water for irrigation and power production, and for war, domestic, and industrial uses. Featured also are methods of flood control, improved navigation, wildlife refuges, and recreational opportunities. Among the revised displays are colorful representations of Central Valley project and building Grand Coulee Dam. One of the recent additions is a new scale model of a modern, 80-acre irrigated farm, showing how water is brought from Reclamation reservoirs to operate an irrigated farm on a year-round basis, and electric fences which separate rotation pastures.

An engraved brass bar, 3 feet in length, designated as the Standard Yard, is exhibited in the General Land Office gallery. This is the original standard which was sent to the Territory of Nevada by the Office of United States Weights and Measures, in June 1861, for the purpose of establishing and checking standard measurements. It was formerly used by the Office of the Surveyor General to check surveyor's chains in surveying the public land. Three large silhouettes entitled "Steamboat and Canal Days," "The Roundup," and "The Sheepherder," totaling 22 feet in length, designed and completed in the museum, were installed in niches over related display cases in the General Land Office gallery. These complete the series of 17 historical subjects portrayed by silhouette in this gallery.

A panoramic pictorial enlargement, approximately 12 feet long, portraying the Wyoming Elk Herd, is a new display in the Fish and Wildlife gallery.

In collaboration with the Geological Survey, new material for the display cases and three large wall niches are in preparation.

A large photo-mural, in full color, illustrates the numerous outdoor activities and recreational facilities provided by the National Park Service for residents of the District of Columbia and neighboring communities. This is particularly interesting during the present period of wartime travel restrictions.

Among the special exhibits is a photostat copy of a chart of the northern portion of Luzon Strait, Philippine Islands, which was seized from the Japanese in the Central Pacific, and insignia taken from members of the Nazi armed forces.

COOPERATION WITH OTHER AGENCIES

During the past year the museum has served many organizations including the San Joaquin Pioneer Museum and the Haggin Memorial Art Galleries of Stockton, Calif.; American and Canadian Sportsmen's Show, Cleveland, Ohio; University of Oregon; State Department; War Department; Navy Department (Office of Naval Records and Library, Taylor Model Basin, and Bureau of Ships). The majority of these services concerned modern display methods, scale models, and diorama techniques. Services in connection with training methods and materials used in visual education and in veterans' rehabilitation programs were rendered to the American Red Cross; Walter Reed General Hospital; and the Disabled Veterans Educational and Conditioning Service of the Newton D. Baker General Hospital, Martinsburg, W. Va.

Suggestions were outlined in last year's annual report for possible use of the museum's facilities for postwar rehabilitation work, particularly for returning veterans who were on military furlough from this Department.

LOAN EXHIBITS AND ACCESSIONS

Last October the museum accepted, for an indefinite period, a life-size bust of Thomas Ewing, first Secretary of the Interior, who served from 1849-50. It was loaned to the museum by Mr. Sherman Ewing, a representative of the Thomas Ewing estate. A marble pedestal and bronze inscription plate are also included in this loan exhibit.

A collection of 13 Indian rugs, blankets, saddle blankets, and a dance drum, selected from the Gibson collection, is displayed as a temporary loan exhibit in the radio studio of this Department.

The museum's book collection has been augmented by "Expressions and Impressions," the autobiography of the late A. A. Anderson, which contains many references to early days in the Yellowstone region. This book was presented by the author's daughter, Dr. Eleanor A. Campbell.

SCHOOL CLASSES

In cooperation with various teacher groups and school organizations, the museum has assisted in planning courses in conservation and other activities represented by the Department. Included in these organizations were the Office of Visual Education of the Providence, R. I., Public Schools, and the Fairfax County, Va., Public School System. The museum's special exhibit of strategic minerals has been duplicated, at private expense, for circulation among the schools of Fairfax County, The Virginia Academy of Sciences, and other similar institutions.

ORIENTATION PROGRAMS

During the year the museum added two important services to established governmental employee relations activities. The departmental orientation program for all new employees, managed by the Training Section, Division of Personnel Supervision and Management, was expanded to include explanatory tours of the museum. The administrative intern program, sponsored by the United States Civil Service Commission to promote the development of junior administrative personnel, also included the explanatory tour service in its course of instruction. These students of government administration represented more than 13 agencies.

Conducted tours were given throughout the year to school classes and many other organizations. In some instances unusually large groups attended. For example, the evening tour of 150 persons from the United States Signal Corps, and the Baptist women's organization group of 500 members.

Inquiries were handled daily at the information desk and special services rendered whenever requested. The museum is attractive to the public and of service to the Department. The assistance extended by the officers of the Department and the cooperation given by the bureaus is gratefully acknowledged.

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